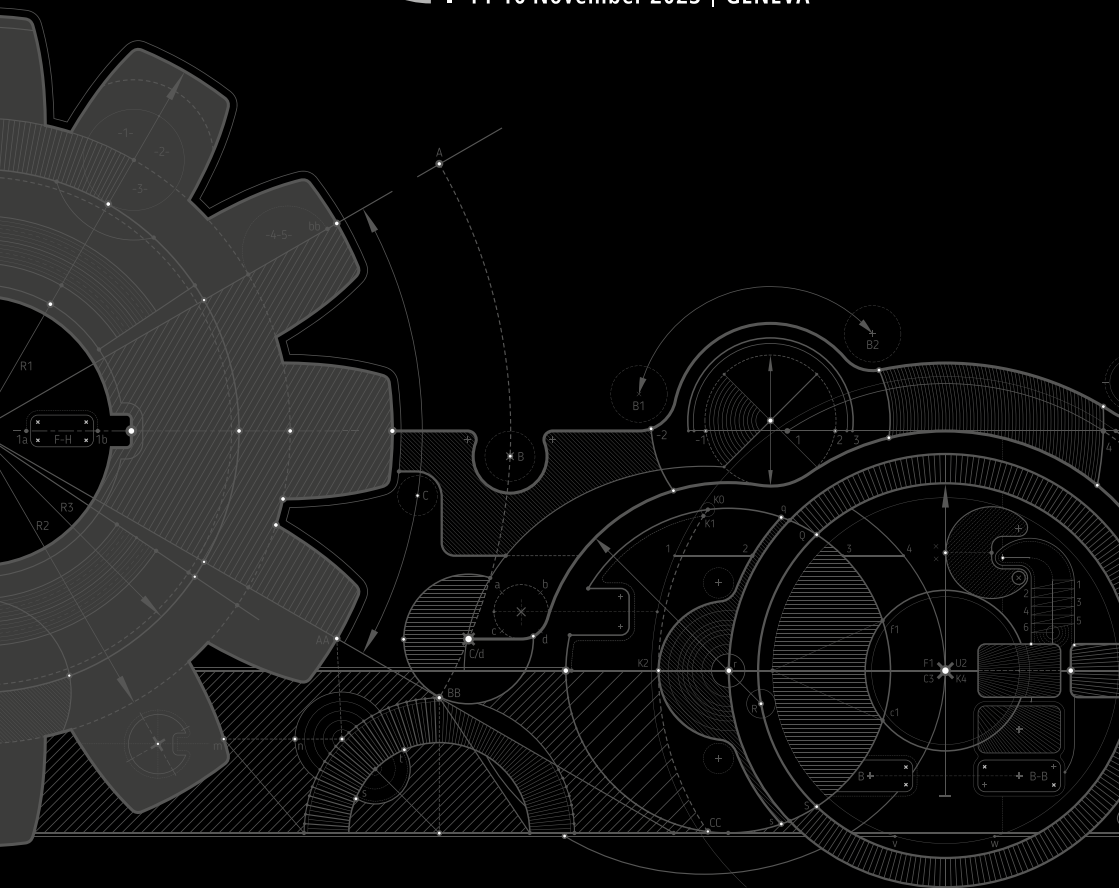




GICHD INNOVATION CONFERENCE

14-16 November 2023 | GENEVA



REPORT

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ABBREVIATIONS AND ACRONYMS

AI	Artificial intelligence
EORE	Explosive ordnance risk education
EORR	Explosive ordnance risk reduction
GICHD	Geneva International Centre for Humanitarian Demining
IMAS	International Mine Action Standards
IMSMA	Information Management System for Mine Action

This report contains oral statements made during the innovation conference. While every effort has been made to accurately represent the content of these statements, actual wording during oral statements may have varied from the transcripts. All photographs included in the report are ©GICHD/Antoine Tardy. Any questions regarding the usage of the photos should be sent to: communications@gichd.org. All session ranking images included in the report are sourced from Slido.

INTRODUCTION AND ACKNOWLEDGEMENTS

The Geneva International Centre for Humanitarian Demining (GICHD) Innovation Conference 2023, a groundbreaking event that aimed to harness the potential of innovation to reduce the risks posed by landmines, cluster munitions and other explosive ordnance, was organised by the GICHD in Geneva from 14 to 16 November 2023.

The conference welcomed 365 participants from more than 200 organisations operating in over 45 countries and territories. It brought together the global community active in humanitarian demining, ammunition management and innovation, serving as a unique platform to promote dynamic collaboration, to make a difference in the lives of countless civilians and to ensure the safety, efficiency and effectiveness of those working in mine action and ammunition management.

The GICHD Innovation Conference connected the dots under six key themes critical to innovation in explosive ordnance risk reduction (EORR) including: standards; communication for social and behaviour change; funding and innovative finance; technology prioritisation; ammunition management; and agricultural land release. The event also featured 11 breakout sessions covering topics such as spatial computing, digital solutions for risk education, remote sensing, artificial intelligence (AI), explosive-detection technologies, underwater demining and climate-change mitigation. Furthermore, more than 30 exhibitors showcased new technologies and innovative ideas and projects.

The GICHD expresses its sincere gratitude to all the participants, exhibitors, moderators and panellists who contributed to the success of the conference. It also offers special thanks to the donor Governments of Switzerland and Germany, which made the event possible, marking a step forward in the ever-evolving field of EORR.



Schweizerische Eidgenossenschaft
Confédération suisse
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Confederaziun svizra

Federal Department of Foreign Affairs FDFA



PARTICIPATION: COUNTRIES AND TERRITORIES OF OPERATION

EUROPE

Azerbaijan	Denmark	Latvia	Slovenia
Belgium	France	Luxembourg	Sweden
Bosnia & Herzegovina	Germany	Netherlands	Switzerland
Croatia	Hungary	Norway	Turkey
Cyprus	Ireland	Serbia	Ukraine
Czech Republic	Kosovo	Slovakia	United Kingdom

AMERICA

Canada
Colombia
United States

AFRICA

DRC
Libya
Nigeria
Senegal
Somalia
South Africa
Sudan

ASIA & OCEANIA

Australia	Lebanon
Iran	Lao PDR
Iraq	Philippines
Japan	Syria
Jordan	Thailand
Kuwait	Yemen



1. OPENING REMARKS

The conference opened with statements made by Ambassador Stefano Toscano and Mr. Jonas Pasquier.



Ambassador Stefano Toscano, Director of the GICHD

‘Dear colleagues,

I am delighted to stand before you today as we embark on the GICHD Innovation Conference 2023, a landmark event that promises to help shape the future of explosive ordnance risk reduction. A warm welcome to all participants. I am deeply grateful for your presence here in Geneva and delighted to see so many of you, even more so in the challenging times that we are experiencing.

The Innovation Conference has evolved significantly since its beginnings. As many of you will remember, the so-called mine action technology workshops focused primarily on technology. This year’s conference expands its horizons and encompasses both technology and broader innovative approaches. We are here to forge connections between good practice and innovation across a multitude of essential topics. Our sessions will address pressing challenges and act as incubators for innovative solutions to emerge, taking into account a simple truth: innovation must ultimately prove desirable, feasible and viable.

Dear colleagues,

Over the next three days, Geneva will serve as the epicentre of what I am sure will be groundbreaking discussions. Six main themes are on the agenda.

Today, we will begin by addressing the pivotal role of standards in the effective uptake of emerging technologies. We will then discuss the power of communication in transforming attitudes and behaviours in areas affected by explosive ordnance.

Tomorrow, we will tackle the pressing issue of funding shortfalls and how innovative finance and partnerships can mobilise funding streams. We will also examine how collaborative partnerships can ensure that research into new technologies aligns with the needs of professionals in explosive ordnance risk reduction.

On the last day, we will turn our attention to ammunition management. We will explore how the new Global Framework for Through-life Conventional Ammunition Management, adopted just recently by the UN General Assembly, and other innovative solutions can help ensure safe, secure and sustainable policies and practices. Our final session will take us to Ukraine. We will look at how innovative, outcome-based solutions can pave the way for a safe and productive future for Ukrainian agricultural land.

In addition to these six main themes, the conference will provide space for 11 more discussions organised in smaller groups. These sessions will focus on subjects such as remote sensing, digital solutions, AI, data quality, climate change, innovative financing, detection technologies and underwater demining.

Dear colleagues,

As we navigate these diverse matters, let us remember that innovation is about evolving perspectives and demands, fostering collaboration and finding creative, feasible and viable solutions to complex challenges. The GICHD Innovation Conference 2023 provides us with a unique opportunity to explore, discuss, debate and innovate for a safer world, free from the risks stemming from explosive ordnance.

In closing, I wish to express my sincere gratitude to the Governments of Switzerland and Germany for their generous funding, which has made this conference possible. Your financial support is a testament to your steady commitment to the noble cause that we all serve.

I very much look forward to the impactful discussions and collaboration that will unfold over the next three days. Together, we can make a difference in the lives of many. They count on us.

Thank you.'



Mr. Jonas Pasquier,
Deputy Head, Multilateral Affairs,
Permanent Mission of Switzerland to
the United Nations Office and other
international organisations in Geneva

'Ladies and gentlemen, distinguished guests and esteemed participants,

It is an honour to stand before you today at the inauguration of the GICHD Innovation Conference 2023, an event that signifies the collective commitment to advancing innovation in explosive ordnance risk reduction.

Switzerland is known for its steadfast dedication to innovation across many sectors and has played a pivotal role in driving progress in mine action. The Swiss Government, recognising the importance of fostering advancements in this critical field, has been a key contributor in this sector, including in its continued provision of funding to promote research and innovation.

As you may know, this year, the Federal Department of Foreign Affairs and the Federal Department of Defence, Civil Protection and Sport have jointly launched the new Action Plan for Mine Action. The plan focuses on three fields of action: the promotion of normative frameworks; humanitarian mine action on the ground; and innovation. In the innovation field, Switzerland not only promotes the application of the International Mine Action Standards and their further development but also focuses on addressing challenges such as urban contamination, improvised explosive devices and the promotion of useful applications of new technologies to make mine action more effective and efficient.

Switzerland's support for initiatives like the GICHD Innovation Conference underscores its dedication to creating a platform for the exchange of ideas. This event, with its diverse representation of mine action and ammunition management national authorities and operators, industry, academia and research and technology organisations, exemplifies Switzerland's commitment to fostering collaboration within the global innovation ecosystem.

As we embark on this journey of exploration and collaboration over the next few days, let us draw inspiration from our collective contributions to innovation in our sector.

Together, let us have productive discussions that push the boundaries of what is possible, explore new avenues for operational efficiency and collectively pave the way for a safer and more innovative future in explosive ordnance risk reduction.

Thank you, and may this conference be a catalyst for transformative change.'

Ms. Nicoletta Flora,¹
Desk Officer Humanitarian Mine
Action, Federal Foreign Office
of Germany

'Ladies and gentlemen, dear colleagues,

It is a great pleasure to be here with you today for this important and timely event, the GICHD Innovation Conference 2023. The rich programme of this conference is a testimony to the commitment of everyone here, to the creativity and diversity of innovative approaches and to the importance of innovation for countering the threats of explosive ordnance and its saddening impact on far too many people around the world.

Promoting innovation in and for explosive ordnance risk reduction has long been an important priority in Germany's strategy for humanitarian mine action worldwide. Germany, therefore, supported the GICHD's technology workshops in 2019 and 2021, which have now blossomed into this conference, bringing together experts from national authorities, mine action operators, academia and industry.

Germany welcomes this conference's focus on innovation, rather than technology, as it reflects an important understanding that we share with the GICHD and surely many of you here. Innovation goes beyond technological advances. It is not an aim in itself. It encompasses all innovative tools, methods, standards and approaches that bring us closer to our shared goal of a safer world, free from the devastating consequences of explosive ordnance. Through innovative approaches, we can enhance the safety of operational staff and affected communities alike, we can improve efficiency, and we have the possibility of developing answers to today's challenges in the field, such as improvised explosive devices or the effects of climate change on mine action.

The German Federal Foreign Office is currently revising its strategy for humanitarian mine action. Without a doubt, promoting innovation, including through funding for applied research and trials, will continue to form a strong pillar of our strategic set-up and engagement. Additional aspects, such as innovative financing and innovation for the adaptation of mine action to extreme weather and climate change, will play an even greater role in our new strategy.

Innovative thinking, and its translation into practical tools, methods and standards, lives thanks to cooperation, exchange and debate. The next days will offer tremendous opportunities to enrich our understanding of what is possible, to learn from and with one another, to bring innovation to the fore and to devise ways to implement it on the ground. Together, let us make it count.

Thank you.'

¹ Ms. Nicoletta Flora was unable to deliver her opening statement owing to unforeseen circumstances. The GICHD nevertheless included her speech in this report to highlight the long-standing contribution of the German Federal Foreign Office to previous GICHD technology workshops, the present Innovation Conference and ongoing GICHD activities in the field of innovation.



2. SETTING THE STAGE

Mr. Valon Kumnova, Chief of Mine Action Programmes, GICHD

‘Dear colleagues and friends,

Good morning and welcome to the GICHD Innovation Conference.

It is a great privilege to stand before you today to set the stage for this important event.

As the title of the conference conveys, and as mentioned by Ambassador Toscano, our gathering has evolved from having a sole focus on technology in explosive ordnance risk reduction to concentrating more broadly on how we may capitalise on overall innovation to address various issues that we are facing today.

Innovation is a term used very broadly, with abundant variations and different interpretations. As we will be talking about innovation often over the next three days, I would like to take a moment to express some thoughts on its definition.

At the GICHD, we believe that innovation can be defined as the creation of new or improved products or processes that bring

a degree of novelty and deliver a positive impact or added value to resolve a particular issue. Two clarifications may help us: first, the degree of novelty should be relative to the sector, as recommended by the standards on innovation of the International Organization for Standardization; and second, the positive impact of innovation on explosive ordnance risk reduction should be measured in safer, more efficient and more effective mine action operations and ammunition management practices.

Another relevant consideration in innovation is that it is multiform. It can be found as a policy, a methodology, in technology or in any other product or process. We in the sectors sometimes have a tendency to consider only technology as innovation, when innovation in reality is so much more than that.

Innovation can also be either a continuous improvement or a disruptive innovation.

First of all, using Slido², what do you think continuous innovation is, in two words?

² Slido is a platform for conducting question and answer sessions and polls during live and virtual meetings and events.

Innovation in the form of a continuous improvement represents the natural evolution of a given product or process. This approach is exemplified in explosive ordnance risk reduction by extensive research and the production of publications, the formulation of national mine action strategies and national mine action standards and regular updates to the International Mine Action Standards and the International Ammunition Technical Guidelines. The GICHD is firmly committed to actively supporting and promoting continuous improvement, as outlined in its current strategy for 2023–2026.

Second, using Slido, what do you think disruptive innovation is, in two words?

Disruptive innovation represents a complete overhaul of established practices within a sector, which may even lead to a complete transformation of the said sector. Explosive ordnance risk reduction is no stranger to disruptive innovation; the introduction of the concept of “land release” led to a complete change in the sector’s approach to mine action. Another example of disruptive

innovation is the use of drones and remote-sensing technologies, which has the ability to revolutionise the way in which minefields are surveyed. Drones equipped with sensors and cameras can quickly and safely identify potentially hazardous areas, significantly reducing the risk to human deminers. The mine action of tomorrow is almost certain to include many more examples of disruptive innovation. Some examples might be machine learning and AI, the use of advanced robotics and the use of augmented and virtual reality not only for immersive training but also for the management of mine action operations.

Over the past 30 years, as a sector, we have made significant progress in generating, disseminating, and codifying knowledge related to new concepts and methodologies. Yet, many significant initiatives that have shown promise still face challenges to their widespread adoption.

So, using Slido, what, in two words, are the main challenges that you believe currently hinder innovation in explosive ordnance risk reduction?



Figure 1: A visual representation of 111 participants’ responses to the question ‘What is continuous innovation?’.



Figure 2: A visual representation of 103 participants’ responses to the question ‘What is disruptive innovation?’.



Figure 3: A visual representation of 104 participants’ responses to the question ‘What main challenges currently hinder innovation in explosive ordnance risk reduction?’.

One of the most prominent challenges is belief in the existence of “silver bullet” solutions. While the attraction of a one-size-fits-all remedy is undeniable, it often disregards the intricacies and contexts specific nuances encountered on the ground. In our collective sectorial experience we can all remember several

cases where new products or processes were presented as the solution to all our problems. In the dynamic landscape of explosive ordnance risk reduction, we have witnessed the emergence of a multitude of innovative tools and technologies, each with its unique strengths and applications. For instance, metal detectors, while invaluable, have not entirely replaced traditional manual



excavation methods. Ground-penetrating radar, a revolutionary technology, does not render metal detectors obsolete. Drones, remote sensing, satellite imagery, mechanical machines, animal detection systems or AI have not replaced the tireless manual deminers who continue to play the most crucial role in mine clearance operations. The realisation that no innovation is in fact the “one size” that “fits all” has paved the way for the concept of a “toolbox approach”. Rather, the key to success lies in understanding the intricacies of each challenge, selecting the appropriate tools from our everexpanding toolbox and adapting our strategies to the specific context at hand.

Other challenges with which we are familiar are the high costs and funding mechanisms associated with mine action activities, which strain available resources and hinder sustained support for research and innovation. Over the last decade, funding for mine action has remained relatively static and grantbased, hovering around \$ 500–600 million per annum. Furthermore, a significant portion of

international funding originates from just a few donors, with 70 per cent of the sector’s total funding coming from six of them. Additionally, 50 per cent of this funding is directed to just five States affected by explosive ordnance. While national contributions have seen an increase in recent years, they still account for less than 10 per cent of the total funding in the sector. With limited funding, concerns over cost-effectiveness quickly come into play: how does one justify investing significant resources in the development of a given innovation when there are not even enough funds to conduct the operations that are already planned? We thus find ourselves at a crossroads, where little incentive is given to mine action stakeholders to take the risk of adopting innovation, although it is crucial that we identify the innovative solutions, including new funding models, that will drive us forward and allow us to have more reliable and sustainable funds and to use available funds more effectively overall.

I would like to also highlight another common obstacle that we face in explosive ordnance

risk reduction, which is people's natural resistance to change and their reluctance to adopt new products and processes. These factors, albeit not unique to explosive ordnance risk reduction, but certainly present therein, can seriously impede our progress and limit the adoption of safer and more efficient techniques. This resistance often stems from a fear of the unknown, concerns about safety or simply a preference for already established, refined and familiar practices. The consequences of this resistance are significant. It can lead to stagnation, missed opportunities for improvement and even safety risks. New technologies and approaches have been designed to enhance safety and efficiency, and resisting them can hinder our ability to address mine contamination effectively. To overcome this challenge, we need to cultivate a culture that welcomes innovation and encourages adaptability. It is about integrating the best of what is new with the tried and tested. Education, training and awareness campaigns play a vital role in dispelling misconceptions and building trust in innovative solutions.

Furthermore, and perhaps most significantly, we experience a general lack of alignment between stakeholders in explosive ordnance risk reduction, in multiple areas, which impedes advancement in innovation. One such area is collaboration and coordination. As we see in this room today, the field of mine action is multifaceted, involving so many varied entities. While each of us plays a vital role in addressing the threat of explosive ordnance, there is often insufficient effective coordination among us, causing duplicated efforts, fragmented approaches and slow progress. Innovation in explosive ordnance risk reduction has a wide array of building blocks, including both stakeholders such as national mine action authorities, mine action operators, academia, affected communities, research and technology organisations and equipment manufacturers, and diverse supporting components, such as standards and regulations, intellectual property rights and funding mechanisms. These building

blocks must be in constant interaction and any bottlenecks or gaps quickly identified to facilitate innovation. This is where an integrated approach, collaborative platforms, information-sharing and joint innovation projects may solve the coordination issues in the promotion of new and safer methods, processes or products.

We are also facing a significant lack of alignment in the sector with regard to the legal and normative frameworks relating to innovation. Do established standards and norms facilitate or hinder innovation in our field? On one hand, standards provide a crucial framework for safety, quality and consistency in mine action and ammunition management. They offer a set of guidelines and good practices that can help ensure that land release and other activities are conducted in a reliable and secure manner. Standards provide a sense of predictability and confidence, both of which are essential for garnering support and investment in mine action initiatives. On the other hand, overprescriptive standards or an overly rigid interpretation of guidelines and policies, particularly outdated ones, have the potential to stifle innovation. So, the challenge lies in striking the right balance between these frameworks and innovation. How can we ensure that standards continue to serve as a foundation for safe and effective mine action, while fostering an environment that encourages innovation and the adoption of new, more efficient technologies and techniques? Likewise, how can we ensure that



relevant regulations, such as liability policies, regularly accompany the development of diverse types of innovation and thus enable their practical use? Ideally, these legal and normative frameworks should not only keep pace with innovation, but also actively support and inspire it.

Lastly, we should also strive to keep in mind that innovation in explosive ordnance risk reduction must be needs-based. Just because we have the possibility of developing shiny new tools to conduct operations this does not mean that it is necessarily the right approach to take. As a concrete example, a large array of the world's minefields are located in difficult terrain where equipment used successfully for land release operations elsewhere is simply not suitable and cannot get the job done. We must always keep in mind what we are trying to achieve and in which specific context we are trying to achieve it; this will help guide our priorities in innovation and ensure that we develop what we actually need.

Dear colleagues,

The challenges that we face are significant, but they are not unsolvable. It is through the synergy of our efforts, the harmonisation of our standards, the addition of tools to our expanding toolbox and the cultivation of a culture that welcomes new ideas that we can overcome the hurdles before us. We would therefore like to offer you, via this conference, a platform for open debate and discussion to enable us to work together to find innovative solutions to these challenges and to move forward together in our sectors. This is also notably a timely opportunity. It is my sincere hope that all that we collectively take away from this conference can be concretely codified in the action plan to be developed at the 2024 Review Conference of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, also known as the Anti-Personnel Mine Ban Convention.

To conclude, innovation is not just a word; it is a driver of a better tomorrow. The impact of our collective action reaches far beyond these walls, extending to communities in need and a future free from the threat of landmines and explosive ordnance. Although the achievement of this common goal seems at times to be moving further away from you as, worldwide, we face increasingly complex challenges beyond our control, innovation is what will help us not only keep pace with these challenges but also mitigate their impact on our work. Let us strive to make the difficult, yet crucial, transition from policy to tools to practical implementation in the field of innovation. With this in mind, let us use this conference not only as a springboard for such a process but also as a testament to our shared, unflinching commitment to making the world a safer place.

Thank you for your dedication, and I look forward to the solutions that will emerge from this conference.

Together, we can make a difference.

Thank you.'





3. BACKGROUND AND AIM

The GICHD Innovation Conference built on previous iterations of the technology workshop that had been regularly co-organised by the GICHD, the United Nations Mine Action Service (UNMAS) and other partners since 2006. Following the last such workshop, the GICHD decided to look beyond technology to broader innovative approaches, including methodologies, processes, policies or funding, in addition to continuing its efforts in support of technological developments within EORR.

The GICHD aimed to organise a multistakeholder, open and inclusive event, with a view to ‘joining the dots’ more consistently across the various EORR-related innovation efforts under way. The conference provided a unique and dynamic platform to discuss current EORR challenges and to help identify needs and opportunities for innovation across mine action and ammunition management activities. As such, the GICHD Innovation Conference was not an end in itself, but rather it was intended to be a tool, within a needs-based approach, to support communication, the establishment of partnerships among stakeholders and the sharing of information.

4. CONFERENCE SESSIONS

4.1 PLENARY SESSIONS

- **Connecting the dots between innovation and standards**
- **Harnessing social and behaviour change communication**
- **Innovative finance**
- **Technology prioritisation: A needs-based approach**
- **Advancing ammunition management through innovative approaches, tools and technologies**
- **Agricultural land release in Ukraine: Outcome-based solutions**



CONNECTING THE DOTS BETWEEN INNOVATION AND STANDARDS

Moderator

- **Mr. Dominik Müller**, Assistant Branch Chief for the Detection of Explosive Ordnance and Improvised Explosive Devices, Bundeswehr Technical Center for Protective and Special Technologies

Speakers

- **Mr. Samir Poladov**, Deputy Chairman of the Board, Azerbaijan National Agency for Mine Action
 - **Mr. Andrew Wilkins**, Director of Business Development, Countermine Division, Minelab Americas, Inc.
 - **Mr. Jonathon Guthrie**, Director of Operations, Norwegian People's Aid
 - **Dr. Jovana Carapic**, Programme Manager, Ammunition Management Advisory Team, GICHD
-



Background

Innovation can be defined as a new or improved product or process that represents a degree of novelty and delivers a positive impact or an added value. The degree of novelty and value are relative and are determined by the perception of the interested parties. The innovation can be a policy, methodology, process or technological product. It can

manifest itself in two primary forms: continuous improvement (or incremental innovation) and breakthrough / disruptive innovation.

Standards and guidelines are typically created to normalise disruptive innovation in a given sector, so that it can be broadly accepted and adopted. Conversely, the revision of standards and guidelines is usually associated with the capturing of innovation that takes the form of continuous improvement.

In general, there is strong evidence linking innovation and standards. Innovation, however, can be hampered when standards are, or are perceived to be, restrictive. Equally, when innovative tools are developed and there are no clear, acceptable international and national standards for their use, their uptake is likely to suffer. It is essential, therefore, to connect the dots between innovation and standards, within an approach based on needs and not on technological demand or funding availability.



Summary of the session

The representative of the Azerbaijan National Agency for Mine Action spoke from the perspective of a national mine action authority, with a specific focus on the adoption of remote sensing technologies based on unmanned aerial systems, nationally manufactured mechanical assets and animal detection systems for land release. The presentation showcased the crucial role of national standards and subsequent accreditation for equipment and the need to ensure that the conditions required for adoption of the new tools and methodologies are in place. The Azerbaijan National Agency for Mine Action has successfully trialled and selected remote-sensing equipment and methodologies based on unmanned aerial systems and has been piloting implementation of the tools in non-technical survey, while learning from the process. Accreditation has been achieved by comparing the results of tests conducted in confirmed hazardous areas before manual clearance with the post clearance results. It is a practical approach that does not hinder recognition of the remaining challenges relating to implementation of these tools. Understanding and management of the factors that influenced their performance, validation of the results and the codification, in national standards, of the accreditation and quality management aspects of their use, the Azerbaijan National Agency for Mine Action has managed to do this within the framework of the International Mine Action Standards (IMAS), even though the IMAS contain little reference to remote-sensing tools using unmanned aerial systems. Nevertheless, the speaker acknowledged that internationally

agreed common standards would be beneficial for consolidation of the efforts of national mine action authorities.

Minelab Americas, Inc. offered an equipment manufacturer's perspective. The company presented its experience in the continuous improvement of handheld metal detectors. The representative of Minelab Americas, Inc. showed how agreed standards and requirements, like IMAS test and evaluation protocols for handheld metal detectors, are crucial not only for understanding what needs to be produced but also for creating a benchmark for improving existing handheld metal detectors by means of new technologies and features. Such importance is attributed not only to the IMAS body of standards but also to other safety and occupational health standards and certifications that apply to handheld metal detectors, without which manufacturers are not able to develop commercially viable products.

The representative of Norwegian People's Aid, a mine action organisation conducting land release operations, spoke from a field perspective. The importance of maintaining the right balance between innovative technologies and innovative methodologies was stressed, as innovative methodologies could be as relevant as technological ones, and sometimes even more so. Building the case for the land release approach and explaining that its codification in the IMAS has revolutionised the way the mine action sector operates, the representative of Norwegian People's Aid stated that evidence based research and analysis in relation to innovative methodologies and their dissemination has played, and is still playing, a crucial role in informing national mine action authorities and the broader sector about the need for new / revised standards. With regard to the adoption of new technologies, Norwegian People's Aid has also been using remote-sensing technologies based on unmanned aerial systems, mostly for non-technical survey, where feasible. The speaker acknowledged, however, that further research and common test and evaluation protocols

to support accreditation and measurement of the actual impact of such applications in land release would enable quality assurance and quality-control practices to be improved. That would enable the establishment of commonly accepted uses and methods of use and would allow tools based on unmanned aerial systems to be considered as part of the deminer's toolbox. Finally, the representative of Norwegian People's Aid suggested, given that accreditation is a national responsibility, that national standards play a pivotal role, and there could be more effort by the sector to support national mine action authorities in developing such standards.



"Technical collaborative advisory bodies play a vital role in guiding technological innovation and in informing and supporting international standards governance bodies."

The representative of the GICHD wrapped up the session with a comprehensive overview of the role of standards and their governance, using examples from mine action (the IMAS) and ammunition management (the International Ammunition Technical Guidelines). Affirming the cyclic relationship between innovation and standards, the representative of the GICHD highlighted the fact that innovation in EORR to date has largely manifested itself as continuous improvement, reflecting recognised good practice. Despite the great relevance of this type of innovation, it is also of the utmost importance to harness disruptive innovation. Although the relevance of the collaborative, inclusive and participative nature of the governance mechanisms provided by the IMAS and the International Ammunition Technical Guidelines was stressed, it was suggested that the establishment of technical collaborative advisory bodies to provide guidance on harnessing to the potential of disruptive technologies, including in support of the

development of standards, could be another avenue to explore.

Discussion

The ensuing discussion between the speakers and the audience, which included **31 questions posed through Slido and six asked directly by members of the audience**, further explored some of the ideas mentioned above.

Innovation within current standardisation frameworks

It was considered that the progress made by the Azerbaijan National Agency for Mine Action in the use of remote-sensing tools based on unmanned aerial systems and the continuous improvement of handheld metal detectors by Minelab Americas Inc. shows that the IMAS strike a balance in defining requirements, prescribing good practice and allowing flexibility in the adoption of innovation, both in its continuous improvement form (Minelab Americas Inc.) and in its disruptive form (Azerbaijan National Agency for Mine Action). Such a conclusion, however, does not demonstrate that the IMAS have been particularly supportive of innovation, given the shortcomings related to the quality assurance and quality control of new tools presented by the representatives of the Azerbaijan National Agency for Mine Action and Norwegian People's Aid. Additional, common, international standards on test and evaluation protocols would further promote disruptive innovation, as suggested by the representatives of the Azerbaijan National Agency for Mine Action, Norwegian People's Aid and the GICHD.

The role of national mine action authorities and national standards

The pivotal role of national mine action authorities and national standards was showcased by the examples given by the representative of the Azerbaijan National Agency for Mine Action and were supported by the interventions by the representatives of Norwegian People's Aid and the GICHD. In

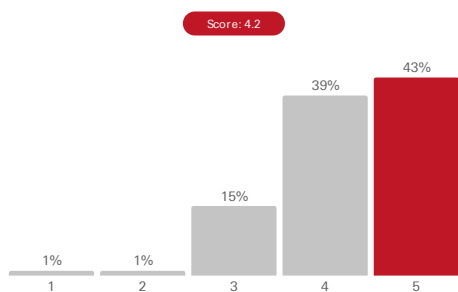
response to a question by a member of the audience about what hindered the streamlining and efficiency of the adoption process, it was stated that evidence-based research and the dissemination of innovative approaches are important ways of informing national mine action authorities of the potential need to revise national standards. This applies to both innovative technologies and innovative methodologies. Additionally, it was reiterated that more effort in the sector to support national mine action authorities in the development of national standards would benefit the uptake of innovation.

Collaborative technical advisory

The collaborative and inclusive, multistakeholder governance mechanisms provided by the IMAS and the International Ammunition Technical Guidelines were emphasised as a means of harnessing the potential of disruptive technologies in support of the development of required new standards. This point seems to garner general support, as it was not challenged by the panel speakers or by the audience.

The subject of test and evaluation protocols for remote-sensing tools using unmanned aerial systems was also debated during the session. The points raised are contained in detail in the summary of the breakout session dedicated to the subject ([see section 4.2, page 47](#)).

67 participants ranked the session:



Key outcomes

- Standards are acknowledged to be catalysts for innovation.
- The IMAS and the International Ammunition Technical Guidelines provide flexible frameworks that support codification of innovation in the form of good practice, while allowing the adoption of disruptive innovation.
- National standards and accreditation requirements for new tools and methodologies have a pivotal role to play in creating the conditions needed for the advancement of innovation.
- International standards can play an enabling role in fostering innovation and supporting national mine action authorities in codifying innovative approaches in national standards.
- Evidence-based research and the dissemination of innovative approaches are critical to inform national mine action authorities and international standards governance bodies about the needs for new or updated standards.
- Technical collaborative advisory bodies play a vital role in guiding technological innovation and in informing and supporting international standards governance bodies.



HARNESSING SOCIAL AND BEHAVIOUR CHANGE COMMUNICATION

Moderator

- **Ms. Céline Cheng**, Advisor, Explosive Ordnance Risk Education, GICHD

Speakers

- **Mr. Tomas Jensen**, Director, Rain Barrel Communications
- **Ms. Clémence Quint**, Co-Founder and Chief Operations Officer, MAGENTA
- **Ms. Sonia Whitehead**, Head of Research, BBC Media Action
- **Mr. Michael Mwendwa**, Disability Inclusion Advisor, International Committee of the Red Cross

Background

In previous years, explosive ordnance risk education (EORE) activities have focused on awareness-raising, on the assumption that greater knowledge would equate to behaviour change. The experience of communities affected by explosive ordnance, however, have challenged this assumption, as individuals would often continue to engage in dangerous behaviour even once they understood the risks. A few reasons for that includes the need to pursue their livelihoods, peer pressure, a lack of alternatives or indifference to explosive ordnance. The theory of social and behaviour

change acknowledges such a response, recognising that human behaviour and decision making is complex and influenced by many factors, including emotions, beliefs, memories, context, the environment and other external influences.

Recognising the limitation of merely delivering EORE sessions and sharing messages, the mine action sector began to explore the adoption of other approaches to improve the efficiency and effectiveness of efforts to effect social and behaviour change. While such

approaches have been successfully used in the public health sector and in communications, their systematic application in EORE is still limited. Existing interventions often neglected social and behaviour change principles and failed to incorporate community insights that would enable the real drivers of and barriers to behaviour change to be targeted. Challenges to the adoption of social and behaviour change in EORE includes limited expertise and resources and difficulties regarding adaptation to the specific subject and operating environment.

Innovation is about new ways of thinking, and social and behaviour change theory challenges EORE and wider EORR action to do just that. When correctly applied, a social and behaviour change approach can strengthen the impact of interventions and the welfare of the communities in question. The objective of the present session was thus to highlight how social and behaviour change and, in particular, social and behaviour change communication, have already had a positive impact on EORE and to show the potential that it has for use in EORR.

Summary of the session

The session provided valuable insight into human behaviour and the related implications for various sectors, with a particular focus on EORR activities. The representative of Rain Barrel Communications shared the foundational concepts of social and behaviour change communication and explained the differences between that and social and behaviour change. He highlighted the irrational and biased nature of human decisions, emphasising that individuals rely heavily on intuition and instinct (95 per cent) rather than rational thinking (5 per cent). He underscored the influence of psychology, sociology and the environment on human behaviour. He also discussed the importance of considering various levels (individual, interpersonal, community, organisational and policy / enabling environment) when implementing strategies related to social and behaviour

change communication. He emphasised the complexity of behaviour change and the need to study the different factors influencing specific behaviour.

In their presentations, the representatives of MAGENTA and BBC Media Action shared practical examples and research findings from social and behaviour change communication projects in Afghanistan, Iraq and Syria. They emphasised the need to tailor social and behaviour change communication approaches to the specific cultural context and highlighted the need to understand the audience and consider their priorities. The presenters also stressed the importance of creating an environment conducive to change and noted that communication might not always be the solution. In many contexts where EORE practitioners work, alternative solutions to intentional risk-taking are needed.

The representative of the International Committee of the Red Cross emphasised the need for a rights based approach to people with disabilities, as outlined in IMAS 13.10 on victim assistance in mine action. He stressed the importance of a comprehensive cycle of social and behaviour change communication for disability inclusion that include identifying people with disabilities, ensuring their participation, making services accessible to them and fostering organisational commitment to the mainstreaming of disability inclusion.

In the concluding remarks, the representative of Rain Barrel Communications spoke of the application of social and behaviour change communication to EORR. He emphasised the importance, in EORE efforts, of access to digital tools, advocating crowdfunding to encourage community engagement, and inclusivity. He also suggested the use of social media channels to strengthen public calls for a total ban on landmines and increased investment in mine action. Additionally, he underscored the importance of training journalists on mine action treaties and policies.

Discussion

The ensuing discussion between the speakers and the audience, which included **13 questions posed through Slido and five asked directly by members of the audience**, focused on the advantage of social and behaviour change projects being people-centric and focusing on solutions that were derived from an understanding of the group concerned; it was expected that the end users of a product would be engaged from the start of the project right to the end. Moreover, it is important to engage the various groups that interact with and influence the primary audience. Indicators should focus on the target behaviours to be changed and on the drivers of those behaviours, rather than on simply increasing knowledge. Finally, as behaviour change is a gradual process, there is a need to maintain long-term engagement with the participants in the project in order to monitor and evaluate its success. That success could be illustrated by means of examples showcasing the change in attitudes and behaviours over time, which would be indicative of sustainable behaviour change. From the perspective of disability inclusion, some examples of sustainability-related endeavours include inclusive internships, in which people with disabilities are exposed to the job market with a view to their long-term inclusion, and the training of people with a view to their long-term inclusion, and the training of people with disabilities as EORE trainers.



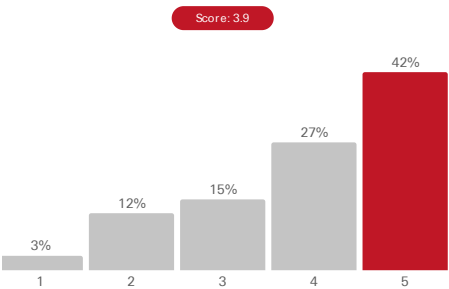
"A tip for a mine action specialist seeking to adopt a social and behaviour change approach: Be inclusive of ALL people."

Mr. Michael Mwendwa, Disability Inclusion Advisor, International Committee of the Red Cross

Key outcomes

- Social and behaviour change approaches go beyond the individual level. Society, the community and the wider environment also need to be influenced in support of behaviour change.
- A specific social and behaviour change approach can be used for research into the target audience, the required means of communication, the testing of materials and qualitative and quantitative evaluation.
- Participatory approaches, throughout the project cycle, are key to successful behaviour change. Success in shifting people's mindset and changing their behaviour can be expected only if an effort is made to understand them and their interaction with their environment and if they are engaged in their own process of behaviour change.

66 participants ranked the session:





INNOVATIVE FINANCE

Moderators

- **Ms. Camille Wallen**, Co-Founder and Director, Symbio Impact Ltd
- **Ms. Danielle Payne**, Mine Action Programmes Officer, GICHD

Speakers

- **Mr. Juan Carlos Ruan**, Director, Implementation Support Unit, Anti-Personnel Mine Ban Convention
 - **Mr. Alexander Wiese**, Co-Founder and Global Head of Finance and Risk Management, Mine Action Finance Initiative
 - **Mr. Ola Medelberg**, Program Officer for Guarantees, Swedish International Development Cooperation Agency
 - **Ms. Carol Piot**, Special Adviser to the Board of Directors, International Finance Facility for Immunisation, and Founding Member, Humanitarian Finance Forum
 - **Dr. Bettina Boekle**, Head of Partnerships for Finance for Peace, Interpeace
-

Background

Over the last decade, funding for mine action has remained broadly static between \$ 500–600 million per annum, particularly if inflation is factored in, with peaks around new conflicts that are short-lived. Some 70 per cent of international funding comes from just five donors, and 50 per cent of the money goes to just five affected countries, on the basis of

the top donors' main political priorities. While national contributions have increased in the five years prior to the conference, they still account for less than 10 per cent of the total funding for the sector.

In the run-up to the Fifth Review Conference of the Anti-Personal Mine Ban Convention, it is considered high time to address this funding

shortfall and power imbalance in an innovative way. In the 2019 Oslo Action Plan, countries have made a political commitment to support innovative financial solutions to the sector's funding problems, but countries affected by explosive ordnance have often lacked the capacity to act. Blended finance mechanisms could help affected countries fund, sustainably, their national strategies and their own national capacity, for example by means of inward and domestic investment strategies. Donors are able to support these efforts by facilitating the development of blended finance mechanisms, thereby leveraging more than they would have been able through bilateral funding and providing stable and more predictable funding streams.

Summary of the session

The representative of the Implementation Support Unit of the Anti-Personnel Mine Ban Convention reiterated that funding for the completion of land release efforts and compliance with article 5 of the Convention remain largely insufficient. A large number of countries are not or no longer on the funding radar, and they have struggled to find resources for implementation of the Convention. Furthermore, only two parties (Argentina and Chile) have been able to complete land release using national financial resources alone; this further illustrates that international assistance is crucial.

The representative of the Mine Action Finance Initiative provided an overview of how innovative finance for mine action could be considered from the point of view of the private sector. The private sector could viably close the funding gap in the mine action sector, and it is thus necessary to ensure that the mine action sector is accessible to it. Any financial product could be broken down into cash flow (money in, money out), and mine action is no exception. Value has to be created, or private money would not come. In that sense, mine action could be coupled with agriculture activities, for

example, and create financial returns that way, but both guarantees and donor capital would be required. Innovative financial products could help close the funding gap and flatten the funding curve caused by the injection of large amounts of funding during emergency contexts. That would allow the funds to be used gradually, as needed, and as could be absorbed by a country. The mine action sector also needs to make the effort to speak the language of the financial sector to make it understand what the mine action sector could offer and how the financial sector could benefit.

To conclude the session, three speakers gave an overview of three different innovative financial mechanisms. The representative of the Swedish International Development Cooperation Agency gave an overview of the guarantees used by the Agency. Those guarantees cover financial losses up to a certain limit, with the risk being shared with other financial institutions / investors. This allows for much larger pools of funds to be mobilised as the risk for the investors is minimised. It is important to remember the principle of additionality, however, in relation to guarantees and to all innovative finance mechanisms, which means that any donor funds attributed to such mechanisms should not replace donor grants.

The representative of the International Finance Facility for Immunisation noted that front-loading mechanisms, like the Facility, allows for long-term, predictable funds. This provides



"To structure innovative finance mechanisms for mine action, coordination and efficiency will be crucial going forward."

**Ola Medelberg, Program Officer for
Guarantees, Swedish International
Development Cooperation Agency**

Innovative Finance

Moderated by Camille Wallen, Co-Founder and Director
Symbio Impact Ltd. and Danielle Payne Mine Action
Programmes Officer, GICHD



Bettina Boekle
Head of Partnerships for
Finance for Peace
Interpeace



Alexander Wiese
Co-Founder & Global
Head of Finance &
Risk Management
Mine Action Finance
Initiative (MAFI)



Ola Medelberg
Program Officer
for Guarantees
Swedish International
Development
Cooperation



Juan Carlos
Director
Implementation Support
Unit, Anti-Personal Mine
Ban Convention



Carol Piot
Special Adviser to the
Board of Directors
International Finance
Facility for Immunisation
Founding Member
Humanitarian Finance Forum



the flexibility needed to deal with diverse, changing needs and with both a lack of, and peaks in, funding. Such an approach could also help stimulate research and development, as demonstrated by the facilitation of vaccine manufacturers' activities in local markets under the Facility / GAVI, the Vaccine Alliance. Impact bonds tend to require high levels of monitoring / measurement of impact, whereas front loading provides clearer and more direct due diligence. To replicate this type of mechanism for the mine action sector, it is crucial to obtain a high value of funding commitments and to calculate evidence-based needs in the sector.

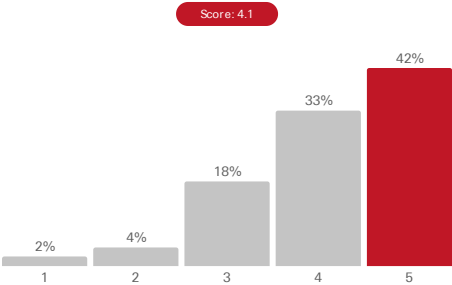
The representative of Interpeace gave an overview of its Finance for Peace initiative and its Peace Bonds. The thematic bonds incorporate verification, by third parties, of adherence to set guidelines, supported by established standards and monitoring and evaluation mechanisms. For such a mechanism to be applied to mine action, specific investment incentives need to be identified and encouraged.

Discussion

The ensuing discussion between the speakers and the audience was punctuated by **18 questions posed through Slido and six asked directly by members of the audience**. While a few technical questions arose, regarding the operation of certain of the innovative finance mechanisms discussed, one of the main points was why it seemed that innovative finance had only just become a viable solution when there has been clear funding gaps in the mine action sector for years. Although there have already been some discussion of the possibility of using innovative finance in mine action, the situation in Ukraine, which is estimated to have led to the need for tens of billions of United States dollars for the completion of land release operations, has prompted strong interest, from a variety of stakeholders worldwide, in finding solutions to ensure sustainable and long-term financing.

At the same time, despite the momentum related to the context in Ukraine, there should be a balance to ensure that investments are not all focused on one country and that no mine-affected country is left behind. This reinforces the need for an innovative finance mechanism that is not solely dependent on the interests of traditional donors. In the same vein, it is essential that any new innovative finance mechanism for mine action does not replace official development assistance and should rather complement to it. Furthermore, it was noted that there is a wealth of knowledge in other sectors that are working on innovative finance mechanisms. The mine action sector should therefore actively seek advice from stakeholders in those other sectors already using such mechanisms.

45 participants ranked the session:



Key outcomes

- There is a clear need for long-term, predictable, reliable funding for mine action, and the current level of funding is extremely insufficient to enable affected countries to comply with their obligations under article 5 of the Anti Personnel Mine Ban Convention.
- Any innovative finance mechanisms to be used for the mine action sector should complement traditional official development assistance rather than replace it.
- The mine action sector must learn to speak the language of the private sector in order to attract new types of investment.
- Various innovative finance mechanisms that exist in other sectors, particularly in the health and peacebuilding sectors, have the potential to be adapted to the mine action sector.
- The escalation of the conflict in Ukraine is a game changer. It is time to act in relation to innovative finance for the sector as a whole so as not to lose the strong momentum that has been created.

TECHNOLOGY PRIORITISATION: A NEEDS-BASED APPROACH

Moderator

- **Dr. Arnold Schoolderman**, Senior Project and Program Manager, Electronic Defence, Netherlands Organization for Applied Scientific Research

Speakers

- **Ms. Angela De Santis**, Deputy Head of Operations, Fondation Suisse de Déminage
 - **Mr. Davor Laura**, Head of Operations, Croatian Mine Action Centre
 - **Dr. Panagiotis Kikiras**, Head, Technology and Innovation Unit, European Defence Agency
 - **Mr. Henry Leach**, Head of Somalia Operations, Conflict Armament Research
 - **Mr. Damir Stimac**, Sales Manager, Global Clearance Solutions AG
-



Background

Equipment manufacturers, research organisations, national mine action authorities and mine action organisations are all essential for any technological advance. Nevertheless, they do not always pursue the same objectives. Equipment manufacturers often pursue revenue. Research organisations mostly pursue the advancement of science and knowledge. National mine action authorities and mine action organisations pursue safer, more effective and more efficient land release practices. These three, generic individual

objectives need to be balanced and adequately aligned for the effective development and implementation of new tools and technologies.

While the above assumption is generally accepted as valid, imbalances often occur in the equation. Research efforts often overlap owing to a lack of coordination, which can lead both to the duplication of work and to solutions that are poorly aligned with operational needs. Lack of coordination also leads to difficulties in the field-testing of innovations in realistic contexts and the effective collection of input from experienced practitioners in the field. This can make the new tools less practical to use. There is often investment in immature technologies as a result of limited understanding of the actual operational challenges. To make up for these shortcomings, it is not uncommon to find a strong marketing-driven approach, which fosters unrealistic expectations among mine action organisations, leading to disappointment. These issues create a cycle of fatigue, diminishing openness to innovation within national mine action authorities and mine action organisations.

The challenges depicted above are generally the result of approaches based on technology. Needs based approaches, however, typically seek to ensure that technological innovation delivers added value or an impactful outcome. Technology prioritisation tools and mechanisms often prove helpful in ensuring that innovation efforts are underpinned by real needs.

Summary of the session

The representative of Fondation Suisse de Déminage, while acknowledging that in mine action, as in any other sector, technology assets are very crucial tools, said that an important starting point is to understand that technology alone would not solve all the challenges faced by the sector. While some technologies might be part of the solutions, the problems need to be clearly defined. The definition of the problem and the identification of the underlying need, together with articulation of how the new technological tool would contribute to a solution, therefore has to be the focus of any technological innovation initiative right from its inception. The experience of Fondation Suisse de Déminage in implementing new technologies and in conducting research into how better to integrate technology into mine action has indicated that shortcomings in communication between researchers / manufacturers and mine action organisations are at the heart of many of the failures of new technologies, which fall short in solving real field challenges. If right questions are asked and the right data are shared and there are mechanisms for the collection of information on user needs and their feedback in a form that is understandable and useful to researchers / manufacturers, it would be easier to identify the real needs. Such mechanisms could also help forecast future scenarios and thus needs in the longer term.

The representative of the Croatian Mine Action Centre shared the national framework established to support research into and the development and operational validation of new equipment for mine action and

highlighted elements related to prioritisation. The Croatian Mine Action Centre for Testing, Research, Development and Training is responsible for research, testing and evaluation of new equipment for mine action. Its set-up is intended to promote alignment among research and technology organisations, equipment manufacturers and operational expertise. Among other mechanisms, the Centre's Scientific Council is highlighted as being a collaborative multinational and multi-stakeholder body that brings together mine action organisations, equipment manufacturers, donors and relevant research and technology bodies such as the European Union / Commission Joint Research Centre, the North Atlantic Treaty Organization, the Swedish Explosive Ordnance Disposal and Demining Centre, the GICHD and many others. Despite it not having formal prioritisation mechanisms, the Scientific Council uses multicriteria analysis to assess new initiatives. Such criteria include the nature and extent of the explosive ordnance contamination, the context, the priorities defined by the Croatian National Mine Action Strategy, the existing tools and technologies and the existing methodology and standards.

The representative of the European Defence Agency presented the European Union architecture for defence research and technology prioritisation, providing a multinational perspective from a different sector. A key feature of the architecture, which is also built on collaborative multinational and multi stakeholder working bodies called Capability Technology groups (CapTechs), is the

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“The definition of the problems, identification of the underlying needs and articulations of how technological tools could contribute to solutions [...] avoids innovation for innovation's sake.”

Audience member

principle of seeking alignment and improving communication between Ministries of Defence and armed forces of European Union countries, the defence industry and relevant national and multinational research and technology organisations. Each CapTech focuses on a specific defence capability area (such as ammunition technologies or geographic information systems) and is responsible for the development of a comprehensive strategic research agenda for that capability area. All the individual strategic research agendas are brought together under the umbrella of the Overarching Strategic Research Agenda, which has also developed a technology taxonomy to support clarity in communication among stakeholders. Each CapTech deals with a number of technological building blocks (such as improvised explosive device detection or fuzing and ignition systems for precision guided munition and missiles), which describes the application of a technology and captures the technological developments that would enable a functionality or a solution to an identified capability gap. CapTechs also develops dedicated road maps for the traditional building blocks, which highlight the possible steps to be taken and opportunities for collaboration in advancing such technological applications. The architecture has proven very effective for the European Union defence sector in fostering collaborative investment in defence technologies that are aligned with real needs in both the short and mid- to long term.

The discussion widened to the subject of ammunition management with an intervention from the representative of Conflict Armament Research, who proffered a practical example of a needs-based approach to technological development for the management of weapons and ammunition stockpiles. He outlined the detailed approach used to define both the problem and how the technological application could contribute to a successful solution. The importance of effective communication was stressed, to be achieved both by minimising feedback cycles between end users and

technology developers and by promoting opportunities for socialisation among them.

Finally, the floor was given to the representative of Global Clearance Solutions AG who spoke from the perspective of an equipment manufacturer. It is important to be aware that the sector has evolved much over the previous 30 years and also to consider whether technological advances in mine action are developing at the same speed as the sector itself. It is unarguable that a multitude of 'silver bullets' has failed to deliver value, and it is to be noted that the sector still operates mostly on the basis of manual deminers with handheld metal detectors and prodders. Some technologies have remained unchanged for many years, despite the technological advances witnessed in other sectors. The representative of Global Clearance Solutions AG was a firm adherent to the principle that the needs, requirements and expectations of mine action organisations should be known and understood before the development of any new product or any new feature of an existing product. To put this into practice, Global Clearance Solutions AG has attempted to establish partnerships among research and technology organisations, equipment manufacturers and mine action organisations to improve cooperation and collaboration. The approach has proven successful. In a final point the representative reflected on the role of donors and suggested that the early engagement of donors with research and technology organisations, equipment manufacturers and mine action organisations could be a key element in fostering and ensuring the adoption of effective, collaborative, needs-based approaches.

Discussion

The ensuing discussion between the speakers and the audience, which included **12 questions posed through Slido and seven asked directly by members of the audience**, further explored some of the ideas mentioned above.

Identification of context-specific problems

The need to define the problems, identify the underlying needs and articulate how technological tools could contribute to solutions was unanimously seen as the most critical element in ensuring that innovation is aligned with the practical challenges faced in the field and in avoiding, as one member of the audience put it, ‘innovation for innovation’s sake’. While collaboration and partnerships have been identified as important tools, it was noted that the framework for technology prioritisation of the European Defence Agency also provides for the dissemination of strategic research agendas and road maps that identify user cases and capability gaps.

Multi-stakeholder collaboration and communication

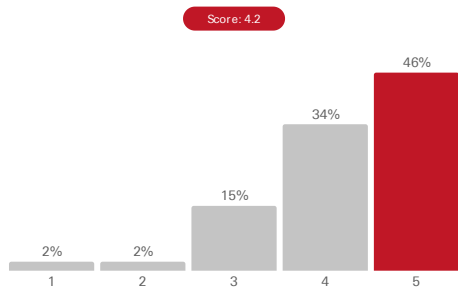
The national and multinational technology prioritisation frameworks presented by the representatives of the Croatian Mine Action Centre and the European Defence Agency emphasise the importance of the establishment of multi-stakeholder collaborative working bodies and support the collaborative approach suggested by the other speakers. Such multi stakeholder collaborative working bodies are able to bring together national mine action authorities, mine action organisations, scientific bodies, academia and equipment manufacturers to make sure that technological solutions are aligned with real challenges in the sector. The role of donors in promoting and ensuring the adoption of effective, collaborative, needs-based approaches was also highlighted.

The representatives of Fondation Suisse de Déminage and the European Defence Agency briefly touched on the potential of technology prioritisation frameworks to support the anticipation of future needs for EORR. Although the issue was not explored in detail during the session, it is worthy of further consideration.

Key outcomes

- The only way to ensure that technological innovation delivers value and impact is to define the problems faced so that the needs can be addressed.
- Multi-stakeholder collaborative working bodies are one of the foundations of successful technology prioritisation frameworks as they ensure the required level of communication among equipment manufacturers, research organisations, national mine action authorities and mine action organisations.
- Such working bodies can also support the implementation of more systematic approaches to prioritising funding for innovation within the sector, namely through the development of a common taxonomy, research agendas and road maps.

41 participants ranked the session:





ADVANCING AMMUNITION MANAGEMENT THROUGH INNOVATIVE APPROACHES, TOOLS AND TECHNOLOGIES

Moderator

- **Ambassador Stefano Toscano**, Director, GICHD

Speakers

- **Ms. Nora Allgaier**, Political Affairs Officer, United Nations Office for Disarmament Affairs
 - **Mr. Hardy Giezendanner**, Senior Researcher, Conventional Arms and Ammunition Programme, United Nations Institute for Disarmament Research
 - **Mr. Lee Moroney**, Director, Global Physical Security and Stockpile Management, and Coordinator, European Programs, Golden West Humanitarian Foundation
 - **Dr. Jovana Carapic**, Programme Manager, Ammunition Management Advisory Team, GICHD
 - **Mr. James Bevan**, Executive Director, Conflict Armament Research
-

Background

The Global Framework for Through-life Conventional Ammunition Management, developed by the Open-ended Working Group and adopted by the UN General Assembly in December 2023 (document A/RES/78/47), highlights innovation as a key element in advancing the adequate through life management of conventional ammunition.

To understand the essence of innovation in through-life conventional ammunition, it is necessary to explore the existing and potential new innovative approaches, tools and technological advancements, both high- and low-tech, that can be developed, reinforced and leveraged to address effectively the safety and security risks associated with the inadequate management.

Summary of the session

The session began with the representative of the United Nations Office for Disarmament Affairs who provided an overview of the Global Framework for Through-life Conventional Ammunition Management. The Framework represents a significant achievement as it is the first international instrument dedicated exclusively to the management of conventional ammunition. Significant innovations within the Framework includes its comprehensive approach, as it covers all types of conventional ammunition, the fact that it addresses safety and security throughout the ammunition life cycle and its integration of a two-tier approach that recognises the diversity of national and regional circumstances. It identifies common enabling measures that all States had committed to implement and possible additional enabling measures that could contribute to the achievement of each of the Framework's objectives in specific national and regional contexts. The Global Framework is intended to be one layer of a comprehensive approach at the global, regional, subregional and national levels, adopting a Through-Life Management approach that integrates safety, security and sustainability measures across the entire life cycle of ammunition. The Framework could lead to the voluntary translation, by regions, subregions and the States within them, of the global-level political commitments into legally binding instruments or commitments tailored to the specific context. Additionally, the Framework confirms conventional ammunition as an issue of standalone concern requiring dedicated attention from the international community and establishes a follow-up and review process.

The representative of the United Nations Institute for Disarmament Research, a voluntarily funded, independent and autonomous research institute within the UN, mandated by the UN General Assembly, emphasised the pivotal role of the Institute in the process that led to the adoption of the Framework. The Institute plays a critical role

in fostering dialogue, generating knowledge products and tools and providing technical advice, support and capacity-building in the context of multilateral instruments and processes related to critical issues in the field of arms control, disarmament and international security. For nearly a decade, it has carried out research, fulfilled its convening function and offered substantive support to the informal and formal processes leading to the Framework's adoption.

The representative of the Golden West Humanitarian Foundation highlighted the Foundation's pioneering efforts in the field of physical security and stockpile management. At the core of the Foundation's approach is a deep understanding of each country's unique needs, obtained through active collaboration with the national authorities. The organisation also engages in mentoring and is committed to localisation to ensure practical support and relevance to communities. Another element of the Foundation's approach involves recognition of a country's capacities and capabilities. By tailoring solutions accordingly, the Foundation ensures the sustained relevance and effectiveness of its assistance. The representative of the Golden West Humanitarian Foundation emphasised the need for long-term commitment when supporting States in ammunition management. Sustained effort and a strategic, enduring approach are required for a lasting impact.

The representative of the GICHD explained that the Ammunition Management Advisory Team, a joint initiative of the GICHD and the United Nations Office for Disarmament Affairs,





“Cooperation and collaboration have an innovation force as well.”

Jovana Carapic, Programme Manager,
Ammunition Management Advisory Team,
GICHD

has been designed with innovation at its core, leveraging the collaborative expertise of both organisations. The Advisory Team focuses on providing support to States at the strategic and higher operational levels of ammunition management, developing their organisational capabilities. As a technical arm of the UN SaferGuard programme, the Advisory Team actively supports the various activities of the programme, including the review and updating of the International Ammunition Technical Guidelines. The efficiency of the Advisory Team is partly attributed to its close collaboration with partners, which highlights the innovative force of cooperation.

The representative of Conflict Armament Research emphasised the organisation's role in supporting effective management of conventional weapons and ammunition. Its approach involves documenting weapons and ammunition at the point of use in active conflict zones and tracing their sources through intricate supply chains. Conflict Armament Research is committed to unravelling illicit weapon flows through investigations on the ground. It collects information about transfers that is essential for the development of effective strategies related to weapon and ammunition management. Notably, the organisation's identification of common sources of weapon and ammunition supplies in different conflicts enhances understanding of the global landscape of illicit weapon and ammunition flows. This comprehensive insight empowers Conflict Armament Research to inform policies and approaches and to contribute to multilateral efforts to address various facets of ammunition management across its life cycle.

Discussion

The ensuing discussion between the speakers and the audience included **11 questions posed through Slido and seven asked directly by members of the audience.**

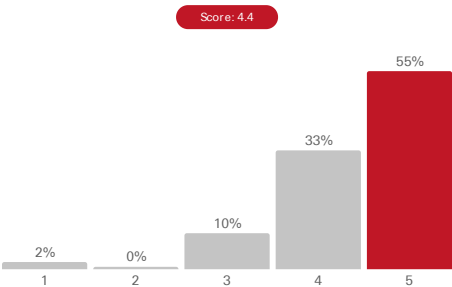
The panel speakers collectively hailed the Global Framework for Through-life Conventional Ammunition Management as a significant leap forward, embodying a comprehensive approach to ammunition management. It was acknowledged that the security aspects of ammunition management require further focus; the International Ammunition Technical Guidelines cover primarily physical security and stockpile management. As the custodian of the International Ammunition Technical Guidelines, through the UN SaferGuard programme, the United Nations Office for Disarmament Affairs has the mandate to conceptualise and coordinate the development of guidelines addressing the security aspects of ammunition management, an effort that requires a multi-stakeholder approach.

The panel further explored means of optimising international cooperation and assistance related to ammunition management, emphasising the need to build State organisational capabilities and move from a 'pass or fail' system to a capability maturity model. The Implementation Support Toolkit for the International Ammunition Technical Guidelines, in particular its self-assessment tools, was highlighted as a valuable resource for countries in assessing their capabilities, developing or adjusting action plans and presenting sustainable proposals to donors. Additionally, the Global Framework for Through-life Conventional Ammunition Management calls for the establishment of a global assistance mechanism under the UN SaferGuard programme and a fellowship training programme on the through-life management of conventional ammunition to be designed and put into operation starting in 2025.

The importance of aligning innovation with the unique needs, capacities and capabilities of each country was stressed in order to ensure the sustainability of the innovation. It was also suggested that innovation did not always have to be groundbreaking or revolutionary: choosing effective, practical solutions, often referred to as 'low-hanging fruit,' could be considered innovative and the most effective approach in certain circumstances.

The discussion concluded with the panellists outlining innovative approaches for advancing the gender perspective. Objective 14 of the Global Framework was highlighted, as it enumerates measures to strengthen gender mainstreaming and the full, equal, meaningful and effective participation of women in through-life conventional ammunition management. The panellists agreed that there is a need to delve deeper into the implications of that objective and its practical implementation. The audience agreed on the need to address the barriers that women face in the sector. The representative of the United Nations Office for Disarmament Affairs mentioned the Women Managing Ammunition Network as one international initiative that aims to raise the visibility of women in technical ammunition management roles and promote capacity-building for women working in that field.

49 participants ranked the session:



Key outcomes

- The Global Framework for Through-life Conventional Ammunition Management represents a long-awaited international instrument dedicated exclusively to the management of conventional ammunition, providing a comprehensive approach that addresses both safety and security issues throughout the ammunition life cycle.
- It is critical to assess a country's needs, context, capacities and capabilities so that a sustainable level of innovation can be determined, as this is crucial for effective ammunition management.
- The provision of support for ammunition management is a long-term commitment that requires gradual but consistent progress and trust between national authorities and implementing partners.
- The development of international guidelines focusing on the security aspects of ammunition management is anticipated, under the coordination of the United Nations Office for Disarmament Affairs.
- Objective 14 of the Global Framework is an innovative element in that it promotes measures to strengthen gender mainstreaming and the full, equal, meaningful and effective participation of women in ammunition management.



AGRICULTURAL LAND RELEASE IN UKRAINE: OUTCOME-BASED SOLUTIONS

Moderators

- **Mr. Rory Logan**, Head, Strategies, Performance and Impact Division, GICHD
- **Ms. Olena Kryvova**, Coordinator, Ukraine Country Programme, GICHD

Speakers

- **Mr. Ruslan Berehulia**, Head, National Mine Action Authority Secretariat of Ukraine
 - **Mr. Serhii Reva**, Head, Humanitarian Demining Organization Division, State Emergency Service of Ukraine
 - **Mr. Anton Bets**, Digitalization Advisor, Ministry of the Economy of Ukraine, and Chief Expert in Project and Program Management, Ministry of Digital Transformation of Ukraine
 - **Mr. Adam Blayney**, Global Technical Advisor for Mechanical Demining, The HALO Trust
 - **Mr. Paul Heslop**, Programme Manager for Mine Action, United Nations Development Programme Ukraine
-

Background

Ukraine has long been considered to be a breadbasket of the world, a key food producer and a major agricultural exporter. According to the World Food Programme, prior to February 2022, the agriculture sector accounted for more than 10 per cent of the country's gross domestic product and around 15 per cent of the country's employment. The ongoing

hostilities have a significant impact on farming communities, on the national economy and more broadly on global food prices. There is a pressing need to ensure that the land is safe to farm and to assess the impact that explosive ordnance has on critical infrastructure used to export agricultural produce.

Summary of the session

The representative of the National Mine Action Authority Secretariat of Ukraine outlined the level of explosive ordnance contamination in the country and its impact. Explosive ordnance pose a significant threat for civilians, degrade agricultural activities and impede food production. The hostilities have resulted in a decrease of 30 per cent in grain export, affecting the country's economy and global food prices. Removal of the threats associated with explosive ordnance and the return of agricultural lands to productive use has been identified as a key priority. The Government has developed a national mine action plan that prioritise the demining of the farmlands that are most important for food security (4,700 square kilometres as at November 2023). The demining of agricultural land in Ukraine is conducted in two phases: rapid demining to ensure access to critical infrastructure and the most economically important land; and humanitarian demining to return land to productive use. Non-technical survey has been prioritised with a view to identifying potentially contaminated areas. By November 2023, accredited mine action operators identified 171 square kilometres of hazardous areas. All the data collected is entered into the Information Management System for Mine Action (IMSMA) for monitoring and planning purposes. The release of agricultural lands has faced a number of challenges, however, including the density of the contamination within 20 kilometres of the line of contact



"A 10-cent increase in the price of a loaf of bread in Geneva is inconvenient, but in Afghanistan, Somalia or South Sudan this would result in people dying."

Mr. Paul Heslop, Programme Manager for Mine Action, United Nations Development Programme Ukraine

and the regular heavy shelling in that zone; clearance efforts undertaken by organisations and individuals with no certification and with a lack of coordination; application of the wrong methods of clearance that have a negative impact on soil fertility and cause the chemical contamination of harvests; and the huge needs in terms of resources. It is of outmost importance to ensure the clearance and safety of roads, railways and waterways so that agriculture products could be transported to ports and reach the global market. The National Mine Action Authority of Ukraine takes steps to increase the efficiency of the country's mine action programme by developing a national strategy, improving standards, introducing the latest mine action technologies and enhancing national humanitarian mine action capacities.

The representative of the State Emergency Service of Ukraine provided an overview of the practical implementation of mine action activities in Ukraine and highlighted key innovations to be looked at for the release of agricultural lands. Given the unprecedented level of contamination, data collection plays an important role in the categorisation of and for priority-setting in agriculture land clearance, tasking and demining. The Government of Ukraine has prioritised three categories of agricultural land on the basis of contamination density and economic factors (i.e. the type of crop to be grown there). As at November 2023, 470,000 hectares of land has been prioritised for demining. Local governments are responsible for the coordination and implementation of the planned activities. Analysis of satellite images is being used by the State Emergency Service of Ukraine to identify fields that are being cultivated so that any land that are not being cultivated could be prioritised for survey. Modern technologies such as demining machines, including robotic equipment, drones and mine detection dogs are used for humanitarian mine action activities in agricultural lands.

The representative of the Ministry of the Economy of Ukraine presented an innovative



approach to the structuring and integration of data to help decision makers in understanding how much land needs to be surveyed, how much time would be needed to conduct clearance and return the land to productive use and how to speed up the land release process. Given the existence of a vast array of data sets, analytics have become the basis of decision-making systems. Strategic decision-making is aided by the secure integration of data sources, granular data governance, alongside model-driven prioritisation, and impact assessment. An innovative tool developed by the Ministry of the Economy / the Ministry of Digital Transformation provides a better understanding of complex data and potential impact factors related to agriculture lands.

Mechanical demining assets have been used in Ukraine to improve the efficiency and effectiveness of operations. The representative of The HALO Trust explained an ongoing project to test and evaluate different kinds of mechanical assets to advance ground preparation, soil softening, vegetation cutting, tripwire disruption, stone removal and the excavation of explosive ordnance to make follow-up demining safer and more effective

and efficient. The project aims to show which assets are most suitable for the Ukrainian context and could thus be scaled up. A national mine action standard on mechanical land release is under development in Ukraine, which could expand the limited framework for testing and evaluation provided by the IMAS.

Unmanned technologies are being used in Ukraine to make mine action processes more effective. The representative of the United Nations Development Programme presented the trials that were conducted to support the Ministry of the Economy in identifying achievable and scalable emerging technologies that would assist in the rapid release of agricultural lands. The trials have shown that unmanned aerial vehicle / sensor technologies and AI could consistently detect both subsurface and surface mines and unexploded ordnance.

Discussion

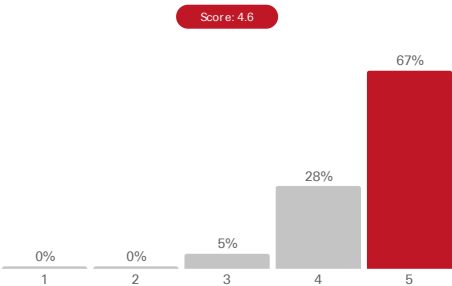
The ensuing discussion between the speakers and the audience included **17 questions posed through Slido and eight asked directly by members of the audience.**

The discussion focused on the need to maintain a balance between, on the one hand, the introduction of new technological advancements and other innovations and, on the other, their institutionalisation through the development of national standards, considering the issue of liability.

In relation to the ongoing debate on whether agricultural lands that have been cultivated could be cancelled via remote assessment, using for example satellite imagery or images collected via drones, the technologies mentioned by the speakers could be used alongside other mine action techniques to help identify evidence of contamination (or the absence thereof). Areas that show no evidence of contamination need to be released as quickly as possible.

There was a common understanding that, in Ukraine, there are a variety of data sets that need to be structured and analysed for the purposes of prioritisation, planning, tasking, strategising and effective decision-making. Furthermore, local communities and authorities play an important role in surveying and the setting of priorities.

60 participants ranked the session:



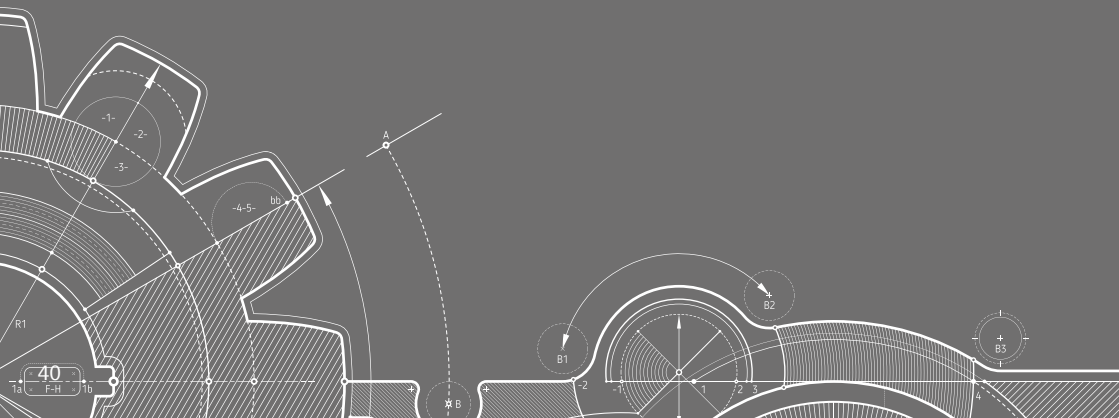
Key outcomes

- In agricultural land release, it is equally important to clear roads and sea routes to ensure the access of agricultural goods to the global market.
- Data collection is key for categorisation and the setting of priorities in agriculture land clearance, tasking and demining work. The Government of Ukraine sets as its priority three categories of agricultural land based on the density of the contamination and economic factors.
- An innovative approach to the structuring and integration of data helps decision makers understand how much time is needed to carry out clearance and to return land to productive use.
- Mechanical demining assets are used to improve the efficiency and effectiveness of operations.
- Unmanned technologies are being used in Ukraine in effective mine action processes. Trials are run to support Ukraine in ensuring the rapidity of the agricultural land release process.

4. CONFERENCE SESSIONS

4.2 BREAKOUT SESSIONS

- Innovative finance of mine action for development initiatives
- Exploring spatial computing technologies in support of operations
- Test and evaluation of remote-sensing technologies based on unmanned aerial systems
- Integrated digital solutions for explosive ordnance risk education
- Utilising remote sensing and geospatial artificial intelligence
- Advances in explosive detection technologies
- Exploring environmental and climate change mitigation practices
- Challenges of underwater explosive ordnance contamination
- Better data quality for better results
- Community resilience initiatives towards climate change
- Developments in artificial intelligence applications





INNOVATIVE FINANCE OF MINE ACTION FOR DEVELOPMENT INITIATIVES

Moderators

- **Mr. Chris Loughran**, Co-Founder and Director, Symbio Impact Ltd
- **Ms. Danielle Payne**, Mine Action Programmes Officer, GICHD

Speakers

- **Mr. Charlie Richter**, United States Director, APOPO, and **Mr. Phil O'Hara**, Programme Manager, Foreign, Commonwealth and Development Office of the United Kingdom of Great Britain and Northern Ireland (on the design of a pilot project on innovative finance for agriculture development in Cambodia)
- **Mr. Paul Heslop**, Programme Manager for Mine Action, United Nations Development Programme, Ukraine (on an innovative finance project in preparation for Ukraine)

Background

As stated during the plenary session on innovative finance (see p.24), there is the potential to fill the large funding deficit that exists in relation to EORR using innovative finance mechanisms. While a wide array of such mechanisms are used in other sectors,

such as in the public health and peacebuilding sectors, there are limited examples of such mechanisms in EORR. One such mechanism, the Development Impact Bond, was explored during the present session, along with the current thinking about mechanisms specifically for Ukraine.

Summary of the session

The representative of Apopo gave a presentation on its Development Impact Bond, as a concrete example of an existing innovative finance mechanism found in EORR. The Bond has been made possible thanks to the support from the Foreign, Commonwealth and Development Office of the United Kingdom and a partnership with Cordaid in Cambodia. The pilot initiative, which was launched in April 2023 and continues until March 2025, focuses on outcome-based financing, with contract payments linked to the achievement of measurable outcomes. The main elements of the Bond involve:

- Investors providing upfront capital to service providers;
- Service providers working with beneficiaries to deliver services and outcomes;
- Outcome funders making payments when the service providers generated pre-agreed positive outcomes;
- Investors being repaid on the basis of the project's performance.

The representative of Apopo explained how the initiative has been set up and the challenges that it faced in implementation, such as acquisition of the up-front funding needed, the costs of third-party verification and the diverse risks associated with the mechanism. The representative of the Foreign, Commonwealth and Development Office complemented the presentation by explaining the importance of innovative finance for the United Kingdom and how that has motivated the Foreign, Commonwealth and Development Office to pursue collaboration with Apopo to establish the Development Impact Bond. The representative of the Foreign, Commonwealth and Development Office also stipulated that the United Kingdom would continue to support innovative finance for Ukraine as a priority.

A representative of the United Nations Development Programme in Ukraine, too, gave a presentation about the current thinking in terms of innovative finance mechanisms for Ukraine, which included front loading, various types of bonds, first-risk mortgages / loans and several other options. The United Nations Development Programme would soon conduct a feasibility study to look in more depth at one of those mechanisms in the context of Ukraine.

Discussion

In the ensuing discussion, it was noted that, although Development Impact Bonds might be replicable / scalable in certain contexts, it is important to consider the fact that independent verification of the outcomes is required and thus necessitates additional resources. Nevertheless, it is important to ensure that national authorities maintain oversight of their national programmes.

Various outcome-based innovative finance mechanisms might be suitable for the Ukrainian context, given notably that global food security is an outcome desired by a variety of stakeholders. More analysis / a feasibility study is needed, however, to assess further which mechanism is best suited to the specific context.

A question that arose both at the present break-out session and at the plenary session was how the mine action sector could move forward as a whole, building on the various discussions on innovative finance that have taken place to date. To do so, there would need to be an inclusive process that actively seeks input from all stakeholders. At the same time, the sector has to accept its lack of experience in innovative finance and accept the support offered by entities already engaged in innovative finance and / or the financial sector. There is no need to reinvent the wheel.

Key outcomes

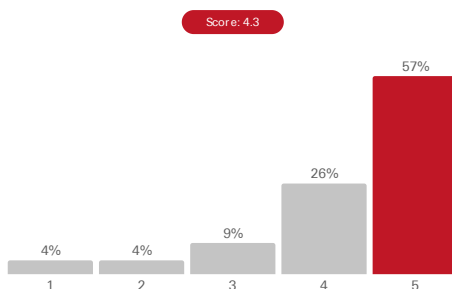
- Efforts should continue to enable better quantification of the actual funding needs in the sector and to ensure that those needs are evidence-based.
- It is necessary to develop the sector's capacity to publicise the needs and all that mine action can accomplish / has to offer investors and the private sector if alternative sources of funding are to be found.
- The above-mentioned processes are required for the development of a viable, scaled product that respects the principle of additionality and is mutually beneficial to the sector and to investors.



"Innovative financing allows donors to tie mine action to broader development outcomes and goals, for which it can sometimes be easier to attract funding."

**Mr. Phil O'Hara, Programme Manager,
Foreign, Commonwealth and Development
Office of the United Kingdom**

23 participants ranked the session:





EXPLORING SPATIAL COMPUTING TECHNOLOGIES IN SUPPORT OF OPERATIONS

Moderator

- **Mr. Philip Jowett**, Advisor, IMAS Outreach and Training, GICHD

Speakers

- **Ms. Erin Atkinson**, Project Manager and Geophysicist, Tetra Tech Inc. (on a 3D model of the old city of Mosul, Iraq, in support of operational planning)
- **Mr. Charlie Valentine**, Co-Founder, EODynamics (on an explosive hazard augmented reality training system)

Background

In the challenging context of dense urban clearance, with multistorey buildings, the aftermath of heavy bombardments poses critical problems. The key issues relate to how to plan and to allocate resources effectively, how to manage the allocation of mechanical

assets strategically and how to set realistic expectations of the clearance process. The session aimed to address those challenges through the use of advanced technologies and methodologies.

Summary of the session

Operational optimisation in the old city of Mosul have to tackle the complexities of post war urban landscapes. The representative of Tetra Tech Inc. explained the use of Autel EVO II Pro drones and photogrammetry to create intricate 3D models of war-affected multistorey buildings in the city. This innovative approach has enabled data-driven decision-making, offering insights into the measurement of streets and the evaluation of volumes of rubble and has ultimately reduced clearance time by an impressive 25 per cent. The integration of drones, photogrammetry and 3D modelling has allowed the smarter allocation of mechanical assets and the efficient use of smaller excavators on the basis of government-provided lists of priority buildings. Local and national capacity have played a crucial role in processing data, fostering effective communication between teams and ensuring optimal resource management.

The preservation of historical sites has been a significant focus, with bespoke outreach efforts targeting reinhabited homes. One noteworthy achievement has been the removal of 17 pieces of explosive ordnance from the Al Masfi mosque. Daily updates of the model, risk assessments and real-time feedback mechanisms has been integral to the operation, which has shown the importance of maintaining the historical integrity and dignity of cleared sites.

The representative of EODynamics presented an innovative view of the future of training in mine action. The organisation's explosive hazard augmented-reality training system represents a transformative shift away from traditional, resource-intensive training methods towards immersive, technology-enhanced experiences. With the goal of creating a more cost effective and efficient approach to explosive ordnance disposal operations, the system employs AI and spatial computing. This not only influenced trainee engagement but

also has a significant impact on knowledge retention and the application of the skills in the field.

The technology, which is able to simulate complex and hazardous environments, has proved instrumental in the provision of real-time training and guidance, particularly in conflict zones. Challenges have been identified, however, in relation to the need for developers to understand humanitarian mine action and the role of explosive ordnance disposal technicians. The session emphasised the importance of creating cross-functional teams that understand one another's responsibilities for successful implementation of a technology.

Discussion

The ensuing discussion considered the multifaceted nature of operational optimisation and the integration of technology into clearance operations. Ongoing challenges were highlighted, particularly in terms of training, hardware limitations and the broader need for a shift in mindset in order to embrace new technologies.

The revolutionary nature of the explosive hazard augmented-reality training system was also emphasised, along with the need for cross-functional teams and the challenge of getting developers to understand humanitarian mine action. Additionally, the potential of the technology to bring substantial cost-effectiveness was acknowledged, especially when it is applied and integrated correctly.



"The true currency is data and we must understand how to manipulate it to guide decision making."

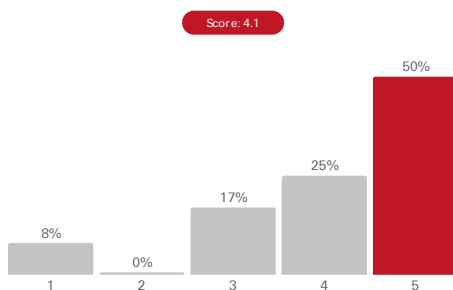
Charlie Valentine, Co-Founder, EODynamics

Key outcomes

- The project to ensure operational optimisation in the old city of Mosul facilitates data driven decision-making, including the measurement of streets and the evaluation of volumes of rubble, resulting in a 25 per cent reduction in the time needed for clearance, with more than 500 buildings processed and 32,000 explosive hazards identified.
- Local and national capacity play a crucial role in the processing of data, in ensuring effective communication among teams and in the optimisation of resources.
- Training in mine action is undergoing a transformative shift away from traditional, resource intensive methods towards immersive, technology-enhanced experiences. This innovation addresses challenges relating to logistics, lowering the associated costs and enabling quantitative feedback.
- AI and spatial computing play a pivotal role in training, influencing trainee engagement, knowledge retention and application of the newly learnt skills. The ability of the technology to simulate complex and hazardous environments supports real-time training and guidance in conflict zones.

- Cross-functional teams that understand one another's responsibilities are crucial for the successful implementation of the technology. The overarching goal is to embrace the technology for learning opportunities, impact assessment and data-driven decision-making, ultimately making operational environments safer through innovative applications.

12 participants ranked the session:





TEST AND EVALUATION OF REMOTE-SENSING TECHNOLOGIES BASED ON UNMANNED AERIAL SYSTEMS

Moderator

- **Ms. Katherine James**, Global Remote Sensing Officer, The HALO Trust

Speakers

- **Mr. Alexey Dobrovol'skiy**, Chief Technical Officer, Member of the Board and Co-Founder, SPH Engineering (on tests to detect unexploded ordnance using drone-based geophysical sensors)
 - **Mr. Jasper Baur**, Co-Founder and President, Demining Research Community, and Lead Scientist, Safe Pro AI (on advancing research and development for detection of explosive remnants of war: A comprehensive field seeded with explosive ordnance and comparative datasets)
-

Background

The standardisation of requirements for the testing and evaluation of mine action technology and equipment, as set out in IMAS 03.40, is unarguably relevant. The harmonisation of field testing and test and evaluation protocols for innovative solutions is a critical step towards the uptake of innovation, whether it be during

the development stage – in support of research and technology organisations and equipment manufacturers – or as part of acceptance criteria and the quality assurance of equipment deployed in land release operations – in support of national mine action authorities and mine action organisations.

Remote-sensing technologies based on unmanned aerial systems have been under development in the sector for some 10 years. While a few national mine action authorities have taken steps towards accreditation of the use of such technologies, and there are mine action organisations willing to use them, no global testing and evaluation protocols have been developed, either under the IMAS or by another standardisation body.

Summary of session

To foster the debate on the subject, representatives of a technology provider and an academic research community showcased the results of their field test set-ups and outlined the main challenges found in research and in the uptake of remote-sensing technologies based on unmanned aerial systems.

The representative of SPH Engineering presented the results of tests of a few types of equipment conducted at the organisation's test field and the SENSYS GeoMil test range, describing some of the limiting factors from a developer's perspective. Among them were a general lack of understanding, among decision makers, of the capabilities and limitations of airborne assets; a lack of established related good practice and recommendations; and a lack of standard procedures and infrastructure for testing and evaluating sensor systems based on unmanned aerial systems. These elements are commonly attributable to a strong belief in the existence of a 'silver bullet', which creates an unrealistic expectation of the tools or technologies.

Building on the challenges outlined, the representative of Demining Research Community explained that its field test, using an area seeded with diverse explosive ordnance, has been set up in partnership with the Global Consortium for Explosive Hazard Mitigation at Oklahoma State University in the United States of America. The field test, which involves around 150 diverse items of explosive remnants of war, aims to support representatives of academia,

“

"The debate around remote sensing based on unmanned aerial systems has evolved in the last years from the hope of a silver bullet to a clearer understanding of the limitations and possibilities of each type of sensor."

research and technology organisations and equipment manufacturers in the mine action sector that are looking for comparative field test infrastructure. Datasets that have already been collected including those related to drone-based thermal, visual, magnetic, ground-penetrating radar, stereoscopic and lidar (light detection and ranging) surveys, cart based ground-penetrating radar, magnetometry and thermal, and traditional handheld metal detection. The expected outcome is the creation of an open-source, multi-modal comparative dataset relating to buried explosive remnants of war that could be used as a benchmark to help advance research in the field of remote-sensing technologies based on unmanned aerial systems.

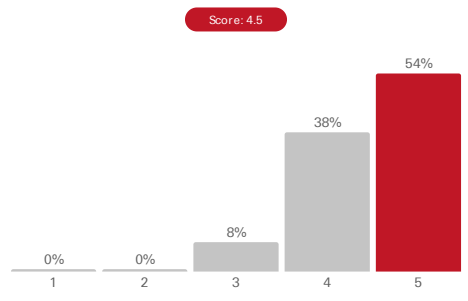
Discussion

In the ensuing discussion, it was acknowledged that debate around the application of remote sensing based on unmanned aerial systems has evolved in the past years from the hope of a silver bullet to a clearer understanding of the limitations and possibilities of each type of sensor. There was a common acceptance that, while current state-of-the-art technologies could deliver capabilities that are relevant for non-technical survey, and to a certain extent of technical survey, further developments are still required to produce tools that support clearance effectively. The aforementioned state-of-the-art technologies are very different depending on the application required: the detection of mines recently laid on the surface;

the detection of old ordnance buried deeply; the detection of anti personnel mines with a low metal content; or the detection of cluster munitions in areas of dense vegetation. In all such cases, specific capabilities might be required.

There was a counterproposal that no additional standards or test and evaluation protocols are needed for the application of remote sensing based on unmanned aerial systems in support of non technical survey because none of the other tools used in non-technical survey required accreditation. A more common view, however, was that the ambition of using remote-sensing applications based on unmanned aerial systems to support technical survey and / or clearance should not be abandoned and that common guidelines and facilities for the testing and evaluation of new technologies and tools are needed to allow research and development to progress.

24 participants ranked the session:



Key outcomes

- Remote-sensing technologies based on unmanned aerial systems have become a common tool to support non-technical survey.
- The lack of agreed testing and evaluation protocols for the development of such remote sensing capabilities still leads to new tools hailed as silver bullets being presented. It remains very difficult for experts or national authorities to identify and characterise their specific limitations clearly and to provide guidance on the improvements required in already tested systems.
- Open-source comparative datasets are one way for experts and national authorities objectively to determine whether progressing in a research and development project is viable for humanitarian mine action.
- Further research and development is needed to bring existing sensing systems, or a combination of existing systems, to a level of accuracy that could enable their wider application in technical survey or clearance. To allow progress in related research and development, common guidelines and facilities for the testing and evaluation of new technologies and tools are needed.



INTEGRATED DIGITAL SOLUTIONS FOR EXPLOSIVE ORDNANCE RISK EDUCATION

Moderator

- **Mr. Abdul Hamid Ibrahim**, Advisor, Explosive Ordnance Risk Education, GICHD

Speakers

- **Ms. Veronika Chechotkina**, Project Manager, East Europe Foundation (on integrated solutions for responding to emergency EORE in Ukraine)
- **Mr. Alfonso Otoy Mejía**, Director General, Fundación Barco (on 'Safe steps', an integrated approach to EORE in Colombia)

Background

The objective of the present session was to showcase integrated digital solutions for EORE and to engage participants in a discussion about good practices, challenges and lessons learnt. Explosive ordnance contamination remains a source of risk for communities worldwide. This situation can be further compounded by accessibility restrictions for

mine action organisations, owing to insecurity, conflict, natural disasters and global health pandemics. Faced with such challenges, organisations delivering EORE have had to adapt their approaches, complementing traditional approaches with digital solutions to reach a broader audience and using techniques that promote behaviour change.

Summary of the session

The representative of East Europe Foundation said that the Foundation uses a combination of digital and in-person methods to reach communities in Ukraine affected by explosive ordnance. The overarching objective of the Foundation is to raise awareness among the Ukrainian population of the threat posed by explosive ordnance, in collaboration with the State Emergency Service of Ukraine. One of the key tools used in the Foundation's integrated approach is a demining application. The application contains an interactive map that shows the presence of the explosive ordnance that has been reported in Ukraine. It also provides EORE messages to the public and encourages greater reporting of explosive ordnance to the authorities.



"Effective digital EORE needs to follow the key principles in IMAS 12.10 on EORE."

Other digital approaches used by the East Europe Foundation include a social media campaign, developed in collaboration with a creative agency; a media project run in partnership with national media outlets; video tutorials for adults and children; and an online course called 'Watch Your Step! Watch Where You Are Going!', with a music video developed in collaboration with a famous Ukrainian artist.

Although the digital campaign has been successful, East Europe Foundation has been aware that not everyone in its target population would have access to or be motivated to change their behaviour through a digital approach. The East Europe Foundation has therefore also implemented offline EORE activities. This has included an outdoor, social advertising campaign, the organisation of explosive ordnance awareness weeks, the development and distribution of a board game

for schools and the development and delivery of in-person EORE training programmes.

The representative of Fundación Barco demonstrated that the organisation's Safe Steps programme in Colombia also exemplifies an integrated approach to EORE. The programme aims to create a more attractive learning experience for younger people. To achieve this, Fundación Barco has collaborated with Discovery (formerly known as Discovery Channel, a cable television channel from the United States of America), Pasos Seguros (a programme about EORE, and Computadores para educar (the Colombian Government's programme to enhance computer access and literacy) to combine expertise in media, communications, education and digital literacy. One of the main highlights of the Safe Steps programme was a mini-series for children called 'Lalo and Lulu Take Safe Steps'. Furthermore, virtual reality goggles have been developed and used during the in-person EORE workshops.

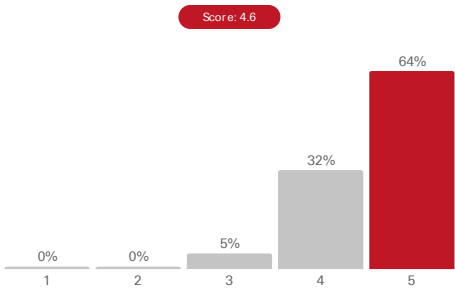
Given that in certain rural areas of Colombia there is no connectivity, or it is too insecure to access, Fundación Barco has worked with sponsors that could offer Wifi and Bluetooth technology to increase access to digital media. Where this was not possible, tools have been designed to work offline so that people in areas with no connectivity could still benefit from the programme.

Discussion

In the ensuing discussion, the representatives of both organisations illustrated how traditional EORE could be complemented by digitalised approaches. Partnerships with organisations that have different expertise were recommended to make EORE more creative and effective. Both representatives also emphasised that effective digital EORE needs to follow the key principles in IMAS 12.10 on EORE. A continued challenge for both organisations that needs to be addressed in the future is the measurement of the impact

of their work. Fundación Barco has conducted an external evaluation of its programme with the United States Agency for International Development that includes baseline and endline measurements. Most efforts to monitor and evaluate, however, are less structured and based on ad hoc reports.

22 participants ranked the session:



Key outcomes

- There are many advantages to digital EORE, such as its large reach, level of engagement with the target audience and attractiveness to participants. It is still essential, however, to combine digital EORE with traditional methods.
- Partnerships with organisations that can offer specialised expertise outside EORE, or with influential individuals, can increase the quality of EORE.
- High-quality and memorable products, with catchy phrases and music, have proven to be particularly successful in digital EORE.
- Use of the right resources and the right channels will help in reaching a wider audience. Statistics have shown that digital EORE can reach a wide audience in a very short space of time.
- Measurement of the impact of EORE work is a continuing challenge, as most efforts to monitor and evaluate EORE are not well structured and based on ad hoc reports.



UTILISING REMOTE SENSING AND GEOSPATIAL ARTIFICIAL INTELLIGENCE

Moderator

- **Ms. Wendi Pedersen**, Advisor, Geographic Information System Solutions, GICHD

Speakers

- **Mr. Xavier Depreytere**, Innovation Project Manager, Humanity and Inclusion (on unmanned aerial system activities and integration of geospatial AI)
- **Mr. Pierrick Poulenas**, Chief Executive Officer and Co-Founder, Picterra SA (on the use of geospatial AI in the humanitarian field and how to build AI easily)

Background

Drones, remote sensing technologies and geospatial AI can all be good tools to be used in land release operations, but how can they be made as accessible as possible to the end user? The present session focused on the integration of unmanned aerial systems and

geospatial AI in mine action and their real world applications. It led to valuable insights into the use of unmanned aerial systems and geospatial AI for non technical survey, the identification of unexploded ordnance, monitoring during clearance and post-clearance land-use assessments.

Summary of the session

The representative of Humanity and Inclusion presented the project Odyssey 2025, which addresses the potential of small-drone mapping for land release. The innovation is not in the technology used, but rather the design of the tool, which aims to adapt existing, commercially available, low-cost technologies to the requirements of the mine action sector, with the needs of the end user addressed as of the early stages. The project has started in 2018 and is firmly rooted in partnerships, first between Humanity and Inclusion and Mobility Robotics and then with national mine action authorities and operators. The project uses a humanitarian-to-humanitarian approach and aims to look at ground sign indicators, almost for free and in the safest way possible.

The representative of Picterra SA talked about the use of geospatial AI in the humanitarian field and how AI applications could be easily tailored to specific needs. Picterra SA has been established eight years previously and focuses on providing a platform that allows any company to build customised AI using Picterra geospatial imagery. The importance of customising AI so that it could respond to specific needs was highlighted, as was the need for it to be efficient and low-budget and integrated quickly and then improved. Session participants were given a live demonstration of the technology, showing how quickly Picterra AI could be trained in detecting explosive ordnance from satellite and drone imagery.



“Using unmanned aerial systems and geospatial AI for mapping, you can cover and search huge areas systematically, and everything is measurable.”

Mr. Xavier Depreytere, Innovation Project Manager, Humanity and Inclusion



Discussion

In the ensuing discussion, the importance of saving imagery for posterity was debated. The imagery is very heavy and challenging to store. If the images become integrated into daily mine action activities in the future, storage might pose a challenge. The conflict in Ukraine has been a game changer in terms of the conduct of rapid mapping using fresh data on a large scale; the storage of those data would need to be centralised.

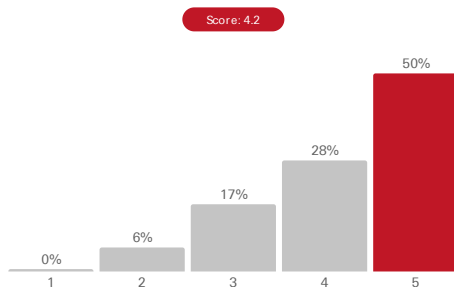
It was pointed out that, although many solutions using remote sensing, unmanned aerial systems and geospatial AI are available, not all of them are used in EORR. In response, it was underscored that one of the barriers to the further adoption of many of such resources is accessibility. Many tools are not user-friendly or can be operated only by experts. The cost could also limit accessibility, with many solutions being out of financial reach for application in the field.

It was concluded that one of the main challenges for EORR lay not so much in the capabilities of current technology, but in how to make those technologies more accessible to the communities in need.

Key outcomes

- Innovation in EORR should focus more on design. Adaptation of commercially available, low cost technologies to the needs of the mine action sector has the potential to have a greater impact in the short term.
- A customisable, efficient, low-cost and easy-to-use geospatial AI platform that can be adapted to specific context-related mine action needs has the potential to solve some of the accessibility challenges that exist in the implementation of new technological applications.
- The speakers called for action to make technologies and tools more accessible to the communities that need them and to bridge the gap between the existence of the tools and their use in the mine action sector.

18 participants ranked the session:



What are the issues for Mine Action?



Ukraine war: after the shooting stops landmines will keep killing – as we've seen in too many countries.

Published August 31, 2023 – Sarah Nieri

Demining community challenges

- The landmine situation is only getting worse – something must change.
- The current metal / GPR detection technology is understood and widely in place.
- Change is very difficult in the demining environment due to rigorous safety requirements.
- Humanitarian demining organisations rely on Donor nations who will want the 'tried and tested.'

How you can help MRead?

- Funding for accelerated research.
- Feedback on our product design through user groups and field assessments.
- Developing future demining systems and processes to take advantage of emerging technology.



ADVANCES IN EXPLOSIVE DETECTION TECHNOLOGIES

Moderator

- **Ms. Lina Castillo Mendez**, Advisor, Operations Management, GICHD

Speakers

- **Mr. Alejandro Pérez**, Director of Operations, Colombian Campaign to Ban Landmines (on the olfactory digital ionic detector technology)
- **Mr. Michael Nevard**, Head, Research and Development, The HALO Trust and **Mr. John Shanahan**, Chief Executive Officer, MRead Limited (on magnetic resonance technology)

Background

The present session focused on the use of non-traditional techniques and solutions, exploring how different detection technologies could contribute to enhancing the efficiency and safety of land release operations.

Summary of the session

The representative of the Colombian Campaign to Ban Landmines introduced the olfactory digital ionic detector, known by its Spanish acronym DIDO, an electronic device capable of detecting the presence of ions of explosive



“Strong collaboration is key to developing new technology and operating in harmony with other systems.”

**John Shanahan, Chief Executive Officer,
MRead Limited**

gaseous compounds in an environment in less than 10 seconds. The device operates using the Android platform, quantifying the detected compounds in parts per million and displaying real-time peaks in graphic form. DIDO has been developed through field tests and has been subject to a certification process in Colombia and Chile. The tests carried out had detected more than 15 elements and had an efficiency rate of around 93 per cent. The latest DIDO, version 3, is undergoing testing and accreditation. The main objective of the device is to support early detection, reduce detection time and minimise risks for the operator.

The representatives of the HALO Trust and MRead Limited presented another technology, magnetic resonance, which has undergone significant development by the Commonwealth Scientific and Industrial Research Organisation. Previously limited by its susceptibility to interference, excess external noise and temperature drift, magnetic resonance has been introduced as a measurement technology in mineral operations and adapted for humanitarian demining. The core technology of MRead Limited is an innovative sensor that accurately detects explosives and illicit drugs. The company has overcome the technical challenges of nuclear quadrupole resonance detection in field environments with high levels of radio frequency noise, but it still has to demonstrate that the breakthrough is real. The magnetic resonance sensors use pulsed radio waves (0–5 megahertz) to detect solid, crystalline targets, but not

full metal enclosures. It is a simple piece of equipment with no standing magnetic field required, so small, practical sensors could be built. Strong collaboration is the key to developing new technology and operating in harmony with other systems. One of the challenges is reaching consensus on change in a demining environment, owing to rigorous safety requirements.

Discussion

In the ensuing discussion, it was agreed that both technologies offer increased speed, safety and efficiency in land release operations and cater to different scenarios and geographical areas. Their application in demining is a promising step towards minimising the devastating impact of landmines globally. Nevertheless, two main challenges relating to their deployment, as well as the crucial role of test and evaluation protocols, were discussed further.

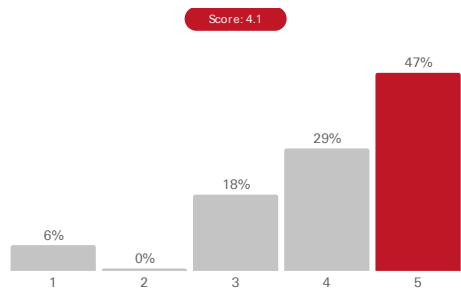
Challenges to deployment

The main challenges outlined in the discussion included the lack of funding and donors' reliance on only tried and tested products; difficult terrain, as radars needed a surface on which to stand in a stable manner; trials and testing requirements that are not always optimum or well established; the lack of a standard way of transferring test results between different environments (for example, the information collected from a desert in Afghanistan would not be fully transferrable to jungle in the Lao People's Democratic Republic), which means that coordination with national actors is very important for building confidence in trials; a lack of access to data for the sensors, which poses a problem in the development process; the fact that the market is dominated by military equipment and strong competition between existing technologies and, as a result, not all proposals make it to the dissemination stage; and the difficulty of measuring a significant improvement in an existing technology.

Test and evaluation protocols

It was underscored that technologies should undergo exhaustive and rigorous trials and testing. The newer versions of both DIDO and the magnetic resonance technology will be completing their internal and field tests in 2024 and, as they are in the early stages, existing test and evaluation protocols for detectors are being followed, where possible, with a particular focus on individual, industry, engineering and user-group interaction and trials.

17 participants ranked the session:



Key outcomes

- The olfactory digital ionic detector – DIDO – and magnetic resonance can offer increased speed, safety and efficiency in land release operations in various scenarios and different geographical area.
- A lack of funding remains a main challenge, along with donors’ reliance on only tried and tested products.
- There is no standard recognition of the results of tests that have been conducted in different environments. Coordination with national actors is therefore very important to build confidence in trials.
- Test and evaluation protocols for detectors are being applied rigorously to the testing of both technologies. A multi-stakeholder collaborative approach is being favoured and used as much as possible.



EXPLORING ENVIRONMENTAL AND CLIMATE CHANGE MITIGATION PRACTICES

Moderator

- **Ms. Linsey Cottrell**, Environmental Policy Officer, Conflict and Environment Observatory

Speakers

- **Ms. Carmen Garcia Duro**, Project Manager, Sustainable Supply Chain Alliance, International Committee of the Red Cross (on mapping carbon emissions using the humanitarian carbon calculator)
 - **Mr. Amro El-Zoubi**, Environmental Consultant and the liaison for the World Food Programme with the Joint Initiative on Sustainable Humanitarian Assistance Packaging Waste Management (on waste management lessons from other humanitarian organisations)
 - **Mr. Htut Kyaw Lin**, Senior Advisor, Norwegian People's Aid (on sustainable procurement and recyclable materials)
-

Background

Although mine action has a positive impact insofar as it effectively and efficiently releases land from explosive ordnance to ensure that it can be used safely, it can also have unintended adverse consequences on the environment. It is important that mitigation measures are

embedded within the mine action sector to avoid or minimise any negative impact, particularly when programmes are planned and implemented. This is not only relevant in the mine action sector but is being done in other humanitarian organisations.

Summary of the session

The moderator stressed the importance of environmental considerations in mine action. It is time for greater awareness of the environment: the year 2023 was set to be the warmest year on record. All individuals and organisations need to play a part, including those in the mine action sector. The Environmental Issues in Mine Action Working Group provides a unique platform for mine action stakeholders to discuss and share good practice in relation to environmental and climate change issues in the sector.

The representative of the International Committee of the Red Cross emphasised that humanitarians have a responsibility to mitigate the environmental impact of their work, in line with the principle of doing no harm. The people most vulnerable to climate change are those affected most by armed conflict. It is important that humanitarian organisations work to reduce their own carbon emissions, starting by measuring them. The International Committee of the Red Cross / International Federation of Red Cross and Red Crescent Societies, in collaboration with about 100 organisations, have developed a free and easy-to-use carbon accounting tool, the Humanitarian Carbon Calculator. The aim has been to develop a tool that would enable a consistent approach to carbon accounting across the humanitarian sector, with a view to helping inform decision-making and preventing the duplication of reporting initiatives.

The representative of the Joint Initiative on Sustainable Humanitarian Assistance Packaging Waste Management pointed out that waste collection and recycling in some humanitarian settings is almost impossible. The priority has first to be to reduce packaging and avoid single use plastics and to reuse packaging and then to collect and recycle packaging waste. The Joint Initiative, in collaboration with the WREC project (Waste management and



"All individuals and organisations need to play a part to address environmental and climate change considerations, including those in the mine action sector."

measuring, Reverse logistics, Environmentally sustainable procurement and transport and a Circular economy), has carried out an extensive mapping of waste and recycling facilities in 27 countries in which humanitarian operations take place. Assessments in 12 more countries are planned for 2024. Mine action organisations are called on to use such mapping for their waste management and where possible to help update the mapping.³ At the time of the conference, the mapping has not looked at elements related to the performance or level of compliance of the facilities, but it was considered an important future component.

The representative of Norwegian People's Aid presented the organisation's research and development work to develop more sustainable personal protective equipment. The project, supported by Innovation Norway, is investigating the use of recycled materials to produce personal protective equipment and demining equipment. Around one tonne of plastic waste per 1,000 deminers is generated every year from the deminers' visors alone. There is also a large accumulation of waste from other personal protective equipment, which is considered as a consumable as it needs to be replaced regularly for safety reasons. Norwegian People's Aid uses a circular economy approach whereby the materials (in this case polycarbonate and aramid) are repurposed to increase their life span and reduce their carbon cost. The innovation might be more costly in the short term, but it is more sustainable in the long term. The next step is to include the estimated carbon emission savings.

³ See <https://logcluster.org/en/document/waste-management-and-recycling-site-visit-questionnaire-july-2023>.

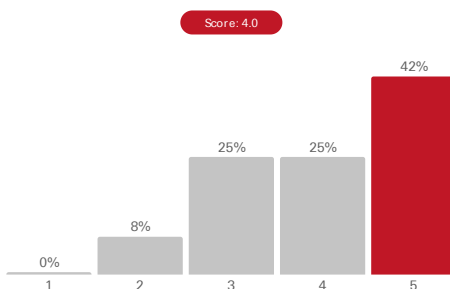
Key outcomes

- Everyone needs to play a part in mitigating climate change, both as individuals and as organisations, including the humanitarian sector in application of the principle of doing no harm.
- For the measurement of carbon emissions, the International Committee of the Red Cross / International Federation of Red Cross and Red Crescent Societies offer a free and easy to use carbon accounting tool, developed by the humanitarian sector for humanitarian organisations.
- Lessons in waste management can be learnt from the Joint Initiative on Sustainable Humanitarian Assistance Packaging Waste Management'. The priority must first be to reduce and reuse waste, and then to collect and recycle it.
- Research and development are being conducted by Norwegian People's Aid, with the support of Innovation Norway, to recycle personal protective equipment and to develop the next generation version of such equipment, without compromising safety of deminers.

Discussion

In the ensuing discussion, it was underscored that all mine action stakeholders need to commit to reducing their emissions and to mitigating their impact on the environments. Investments are required upfront, but the benefits would be seen in the future. Initiatives that are already in place in the wider humanitarian sector, including some in mine action, need to be used and expanded.

12 participants ranked the session:





CHALLENGES OF UNDERWATER EXPLOSIVE ORDNANCE CONTAMINATION

Moderators

- **Mr. Charlie Wilson**, Consultant, EODEX UK Subsea Ltd
- **Ms. Åsa Massleberg**, Programme Manager and Senior Advisor, Strategic Planning, GICHD

Speakers

- **Mr. Hervé Rozec**, Manager, SEMTEC/DEMINETEC Group (on underwater explosive ordnance survey and clearance operations, including the requirements imposed by the International Marine Contractors Association. and / or other international / national standards / regulations)
- **Mr. Doug Hrvoic**, President and Founder, Marine Magnetics Corporation (on an instrumentation suite for magnetic detection of unexploded ordnance in marine, land and transition environments)

Background

Underwater explosive ordnance contamination is becoming a subject of growing relevance. While it is not completely new, the growing need to use maritime resources, such as wind farms and intercontinental maritime cables and pipelines, has given rise to renewed debate. This is due, on the one hand, to the need to tackle legacy contamination and, on the other, to the implications of recent and current conflicts attempting to disrupt freedom of navigation. These elements have come at the same time as a deeper understanding of the wider implications of underwater explosive ordnance contamination (such as the environmental impact of dumpsites in the sea, lakes and other inland waterways) for the achievement of many of the Sustainable Development Goals. Moreover, while military naval forces and commercial companies have been the main actors the field, in many regions the broader implications of such contamination might place national authorities at the centre of the debate. Therefore, a broader discussion is needed on the capabilities, equipment,

frameworks and methods required to deal with such contamination and on the extent to which the adaptation of existing land release concepts and mine action practice could provide a suitable framework, and whether new approaches are needed.

Summary of the session

The session debated the nature of the problem, the conduct of underwater survey and clearance operations, including the standards and requirements imposed in the maritime domain such as by the International Maritime Contractors Association, and the challenges related to innovative approaches.

It was pointed out that the bulk of underwater explosive ordnance is likely to be the result of legacy sea minefields, which could extend very far and contain large numbers of sea mines. Other unexploded explosive ordnance in the water include munition that have malfunctioned, which is usually concentrated in bombing ranges used for military training and former naval battle sites. There is also abandoned explosive ordnance, the bulk found





"Many questions related to underwater explosive ordnance contamination remain unanswered and further research and investigation is needed."

in dumping grounds or where ammunition-laden vessels have sunk or been stranded. Each of type of ordnance carries not only its particular explosive hazard, but also the potential to have for a long-term toxic effect on the environment. Furthermore, the underwater environment gives rise to complexities additional to those already common in EORR on land. Water is typically harsh on manufactured structures: it infiltrates mechanisms; the salt in the water corrodes most metals; and water is in constant motion, with tides, currents and streams continually moving objects, stressing materials and shifting substrates. The presence of water is considered as possibly the single greatest influence on the ageing of explosive ordnance. In addition, the design and nature of sea mines bring yet another layer of complexity.

The representative of SEMTEC spoke from the perspective of a commercial operator that conducts underwater survey and clearance operations, mostly for the purposes of renewable energy infrastructure in the sea. Among the leading challenges are aspects related to international regulations. In addition to the IMAS on the subject, which were very welcome, there are other national and international regulations applicable to the maritime environment with which the operator has to comply. The International Maritime Contractors Association defines mandatory standards for many aspects of operations, including in relation to marine explosive ordnance. The logistical requirements for vessels, equipment, training and certification, of divers for example, represents a heavy

financial burden for operators as they have to develop and maintain such capabilities.

The representative of Marine Magnetics Corporation presented a case study of the survey and clearance of Lake Karujärv on the island of Saaremaa, Estonia. It showcases the innovative use of existing underwater magnetometer technologies. The shallow lake, which has a maximum depth of two metres, was used by military aircraft as a bombing range. The characteristics of the water environment and the fact that the type of explosive ordnance was known permitted the deployment of a combined set of military and unmanned aerial magnetometer sensors, which mapped the contaminated areas, based on the geophysical data acquired. After their georeferencing and marking, a diver would confirm the targets with a handheld underwater magnetometer. The possibility of replacing the diver with unmanned underwater platforms capable of confirming the target is also being looked into. The main challenges include the need for highly accurate global positioning systems and the need for minimal geophysical expertise for the processing of the geophysical data collected by the magnetometers.

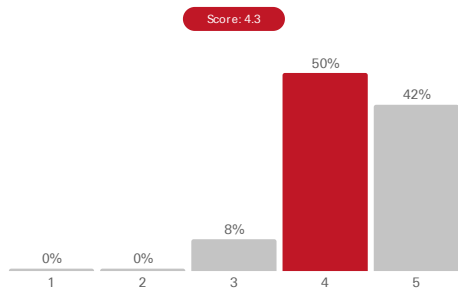
Discussion

In the ensuing discussion, there were interventions about the strategic, operational and technological aspects of the subject. It was noted that underwater explosive ordnance is not covered by any of the international conventions that endorse mine action efforts, which might be hampering further advances within the field. Furthermore, standards applying to the underwater environment that have emanated from different sectors are not always in full alignment, thereby creating additional challenges for operators. As regards to the technical and technological aspects of underwater explosive ordnance survey and clearance, the underwater environment often require specific expertise and methodologies tailored to the context. Finally, despite their

relatively high cost, underwater unmanned platforms could represent an interesting basis for future developments in the sector, owing to the costly logistical burden on operators posed by the need to maintain capabilities and run operations in marine environments. New technologies are evolving rapidly, however, providing greater capabilities at lower cost and requiring less user expertise than ever before. That means that contaminated areas that had previously been inaccessible owing to the absence of the right tools are now open to remediation.

Although the session was very much welcomed by the audience, there was general consensus that many questions related to underwater explosive ordnance contamination remain unanswered and that further research and investigation are needed.

12 participants ranked the session:



Key outcomes

- Standards applicable to the underwater environment that emanate from different sectors are not always in full alignment, creating additional challenges for authorities and mine action operators. An effort to further align the IMAS with other applicable international standards would be welcome.
- Logistical requirements relating to vessels, equipment, training and certification, of divers for example, still represent a heavy financial burden for operators as they have to develop and maintain such capabilities.
- Despite their relatively high cost, underwater unmanned platforms may represent an interesting basis for future developments in the sector, given the current high cost of maintaining logistical capabilities and running operations.
- New technologies are rapidly evolving, providing greater capabilities at lower cost and requiring less user expertise than ever before. This is opening to remediation contaminated areas that were previously inaccessible because the necessary tools were lacking.



BETTER DATA QUALITY FOR BETTER RESULTS

Moderators

- **Mr. Andrew Kesterton**, Information Management Technical Development Coordinator, GICHD

Speakers

- **Mr. Abdullatif Abujarida**, Head, Database Unit, Libyan Mine Action Centre (on resolving data quality issues and migration from the IMSMA database to IMSMA Core)
- **Mr. Rami Alouta**, Senior Solutions Engineer, Esri (on advanced validation techniques in ArcGIS Survey123)
- **Mr. Yoshiyuki Shiomi**, Associate Humanitarian Affairs Officer, United Nations Mine Action Service (on an introduction to the mine action field guide for the displacement tracking matrix)

Background

Data-quality measurements are based on factors such as data accuracy, completeness, consistency and reliability and consideration of whether the data are up to date. The measurement of data quality helps organisations identify errors in data that need to be resolved and assess whether their data

are fit for purpose. As the main information management system for mine action, IMSMA is no stranger to this challenge. The session saw representatives of a national authority, an international partner and a technology provider describe the various challenges that they have experienced in efforts to improve data quality.

Summary of the session

The representative of the Libyan Mine Action Centre presented the Centre's data-cleaning process during its migration to IMSMA Core. It included as many checks as possible in the process to ensure good quality data. The data-cleaning process dealt with two major causes of poor data quality: human error and system-related challenges. The use of up-to-date technology, such as ArcGIS Survey123, could prevent errors at the data-collection level (constraints, automatic calculation, polygon validation) and at the validation and confirmation levels. The Centre used four levels of validation: two by the operators and two by the national mine action authority. The representative of the Libyan Mine Action Centre also gave examples of how to address issues related to the entry of coordinates outside Libya and to the avoidance of overlapping polygons and invalid polygons.

The representative of Esri gave a live demonstration of advanced techniques in ArcGIS Survey123 to improve data collection. It focuses on automating data-collection workflows by capturing device location, issues related to metadata, work with external data sources and the extension of ArcGIS Survey123 with JavaScript.

The representative of the United Nations Mine Action Service outlined the displacement tracking matrix. For mine action, the data collected is both direct and indirect and related to explosive ordnance contamination and EORE activities. He explained the strengths and limitations of the system and how mine action partners could use the data, giving the examples of Ethiopia and Nigeria.

Discussion

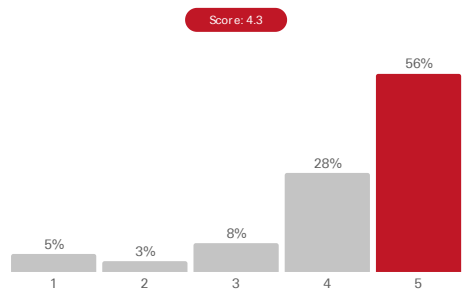
In the ensuing discussion, it was pointed out that one of the biggest challenges related to mine action data is ensuring their quality, availability and accessibility. The use of state-of-the-art technology is important to obtain better data. Given the possibility of human error and system-related challenges, it is deemed important to pay attention to errors, track where poor-quality data comes from and create the right data-collection process, including by using appropriate tools, such as ArcGIS Survey123. It was also noted that mine action activities are not conducted in isolation. They could benefit greatly from partnerships that would bring increased in data availability and accessibility and improved data quality through the cross-referencing of data sources.



"The biggest challenges that people face when using mine action data relate to its availability / accessibility (57 per cent), accuracy (29 per cent) and completeness (14 per cent)."

Mr. Andrew Kesterton, Information Management Technical Development Coordinator, GICHD (on the basis of a question posed to the audience by means of Slido)

39 participants ranked the session:



Key outcomes

- The main challenge identified in relation to the use of mine action data remains ensuring its quality and accessibility. There are generally two major causes of poor data quality: human error and system-related challenges.
- By using up-to-date technology, errors can be prevented at the data-collection level (constraints, automatic calculations and polygon validation) and at the data-validation and confirmation levels, to ensure good-quality data.
- Partnerships can help with obtaining access to existing key data for the prioritisation and design of mine action operations.



COMMUNITY RESILIENCE INITIATIVES TOWARDS CLIMATE CHANGE

Moderator

- **Ms. Christelle Mestre**, Advisor, Strategic Planning, GICHD

Speakers

- **Mr. Michael Heiman**, Head of Mine Action Programs, APOPO (on restorative planting projects, agroforestry and syntropic farming)
 - **Ms. Emily Chrystie**, Global Environment Manager, the HALO Trust (on community livelihoods through mangrove and ecosystem restoration)
 - **Mr. Alejandro Pérez**, Director of Operations, Colombian Campaign to Ban Landmines (on opportunities to support sustainable livelihoods)
-

Background

Mine action actors are in a unique position when working in conflict-affected and post-conflict areas. They show strong community engagement, have an understanding of how communities engage with the land and are in close dialogue with national authorities.

Mine action actors have recognised the need to ensure that land that is released following clearance is used to support sustainable livelihoods, thus providing multiple community benefits, including resilience to the effects of climate change.

Summary of the session

The session moderator reaffirmed the importance of climate-change mitigation, adaptation and resilience in light of the current context of increasing temperatures worldwide. She highlighted that 60 per cent of the 20 countries that are most vulnerable to climate change are also contaminated by explosive ordnance. Mine action therefore plays a critical role in contributing to climate-resilient development.

The representative of APOPO outlined the organisation's syntropic agroforestry initiative. He explained that agroforestry replicates natural processes, allowing fruit and vegetables to grow rapidly without damaging the soil and preserving ecosystems. The project has, however seen some challenges in Zimbabwe, where APOPO has piloted it in a post-clearance setting. The experience has highlighted the need for the participation of the communities concerned in the first stages of implementation and in after-care management plans. Nevertheless, agroforestry in mine action (both for communities in post-clearance settings and for local deminers demobilised when the programme has reached completion) is a simple and accessible tool that could be replicated in many countries.

The representative of the HALO Trust spoke about a mangrove restoration project that is being carried out in Sri Lanka. Mangroves are one of the top three carbon capturing ecosystems on Earth. In the Northern Province, extensive mangrove ecosystems were destroyed during the Sri Lankan civil war in order to lay landmines and construct defense systems. Restoration of the mangrove ecosystems, which have been further affected by mine action operations, is critical in order to support the climate and livelihood resilience of communities affected by explosive ordnance. The HALO Trust has partnered with a local organisation that has experience running mangrove restoration projects in the region

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"60 per cent of the 20 countries that are most vulnerable to climate change are also contaminated by explosive ordnance. Mine action therefore plays a critical role in contributing to climate-resilient development."

and has received expert advice from two external mangrove ecologists. While it was not initially planned in the design of the project, the representative of the HALO Trust, too, emphasised the importance of after-care management in such planting initiatives.

The representative of the Colombian Campaign to Ban Landmines said that the Campaign is implementing combined environmental mitigation and adaptation measures as part of its mine action operations. He reaffirmed the Campaign's commitment to implementing effective environmental management, notably through community liaison and knowledge dissemination. Thanks to its community approach and support to communities beyond land release operations, the Campaign has been able to provide advice to farmers on seeds and terrain, in partnership with relevant agriculture specialists, an initiative that eventually contributes to their climate resilience.

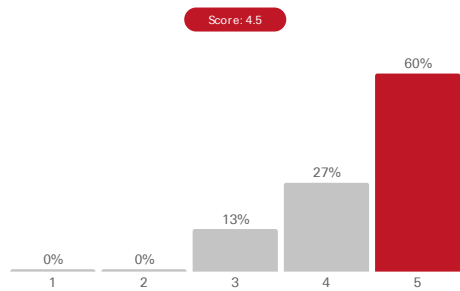
Discussion

In the ensuing discussion, a member of the audience raised the issue of explosive ordnance pollution. The representative of the HALO Trust said that the organisation is partnering with universities in Ukraine (agriculture colleges) to look into the question of soil contamination and fertility. Soil remediation is a difficult endeavour, however, so the priority should always be to manage mine action practices sustainably.

Another topic of discussion was the challenges associated with waste management and the disposal of explosive ordnance in mine action. Although the good practices described in IMAS 07.13, on environmental management in mine action, trickled down to national mine action standards and standard operating procedures, the sector needs to do more to ensure that the process is more widespread and systematic. Many organisations have internal regulations on waste disposal, but, owing to improper waste management systems in the countries in which they operate, the risk of environmental damage remains.

The session concluded on the topic of climate resilience in mine action. The building of partnerships with environmental organisations, the adoption of community-based approaches, the promotion of context-specific environmental protection and the proposal of simple and feasible solutions were all key take-aways from the presentations. Innovation in mine action is not only about new technologies but also about the application of new approaches that look beyond the outputs of mine action and considers factors related to climate change and the environment to build a more sustainable future for all.

30 participants ranked the session:



Key outcomes

- A number of mine action organisations, both national and international, have started to consider the enabling role of mine action in promoting greater community resilience through a multi-stakeholder approach.
- Soil remediation following pollution is a difficult endeavour so the priority should always be to manage mine action practices sustainably.
- The good practices on waste management and the disposal of explosive ordnance described in IMAS 07.13 do trickle down to national mine action standards and standard operating procedures, but the sector still needs to do more to ensure the inclusion of environmental and climate-change considerations in mine action activities.
- It is important for the mine action sector to increase partnerships with environmental organisations, adopt community approaches, promote context-specific environmental protection and propose simple and feasible solutions to further its role in building communities’ resilience to climate change.



DEVELOPMENTS IN ARTIFICIAL INTELLIGENCE APPLICATIONS

Moderator

- **Ms. Olena Kryvova**, Coordinator, Ukraine Country Programme, GICHD

Speakers

- **Mr. Emile LeBrun**, Director of Programmes, Tech 4 Tracing (on the computer vision detection of explosive objects)
 - **Mr. Gabriel Steinberg**, Safe Pro AI (on the first drone image analysis tool built for deminers)
-

Background

The practical integration of AI into EORR operations presents a pivotal challenge and an opportunity in the field of mine action. Current developments show the potential application of computer vision algorithms powered by AI in support of explosive ordnance detection and identification. As discussed during the breakout

session on the testing and evaluation of remote-sensing technologies based on unmanned aerial systems ([see section 4.2, page 47](#)), when effectively applied such systems could prove effective tools in supporting land release, enhancing the speed, accuracy and safety of EORR operations.



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"The intelligence is in the data."

Mr. Adam Harvey, Tech 4 Tracing

Summary of the session

The session focused on two transformative projects at the forefront of AI applications in EORR: the Tech 4 Tracing computer vision detection algorithm project and the Safe Pro AI drone image analysis software. The representative of Tech 4 Tracing showcased the organisation's ambitious Automated Arms and Ammunition Mapping project, which is supported by the European Union and aims to automate the visual detection of explosive ordnance using computer vision algorithms. The representative of Safe Pro AI unveiled the first drone image analysis software tool designed for deminers. The cloud-based tool harnesses highly accurate computer vision to identify swiftly areas of surface contamination.

The two organisations provided complementary perspectives. The representative of Tech 4 Tracing highlighted the theoretical and practical advancements in automated detection,

identification and intelligence through computer vision, which are applicable not only to surface unexploded ordnance but also to various other objects. The representative of Safe Pro AI, who emphasised the use of high resolution maps compatible with geographic information systems for predicting the location of unexploded ordnance, showcased the potential use of advanced data processing in mine action.

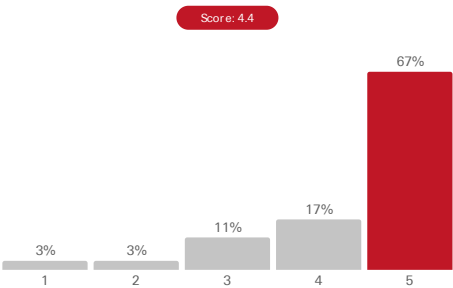
Various aspects of AI applications were covered during the session, including the related methodologies, the associated challenges and the potential impact on arms control. The panel explored the theoretical and real-world efficiencies offered by these advancements, discussing accuracy rates, false positives and the significance of synthetic and real-world data. The proposal by the representative of Tech 4 Tracing for the establishment of a benchmark data consortium highlights the collaborative efforts needed to enhance testing and evaluation algorithm capabilities and shared databases.

Discussion

The ensuing discussion illustrated the multifaceted applications of AI in EORR. The use of computer vision and other forms of AI in detecting explosive ordnance is a groundbreaking development. The discussion touched on natural language processing for desk assessments, the potential of computer vision for arms control documentation and the challenges posed by false positives. The need for a nuanced approach and a mix of synthetic and real-world data emerged as key. The methodologies, which range from drone

protocols to thermal imaging, highlighted the complexity of the considerations when using AI in demining operations. The Safe Pro AI cloud-based tool utilises highly accurate computer vision within a secure and scalable framework. It has the potential to transform the traditionally resource intensive task of drone image analysis into a more accessible and efficient process, compatible with the use of off-the-shelf unmanned aerial tools. In addition, the Tech 4 Tracing project, using innovative algorithms, represents a significant practical advancement, showing how AI could transform the detection process. It not only demonstrates the impressive capabilities of the algorithms, but also addresses inherent weaknesses in data collection by giving control back to the user, rather than it being dictated by the algorithms.

36 participants ranked the session:

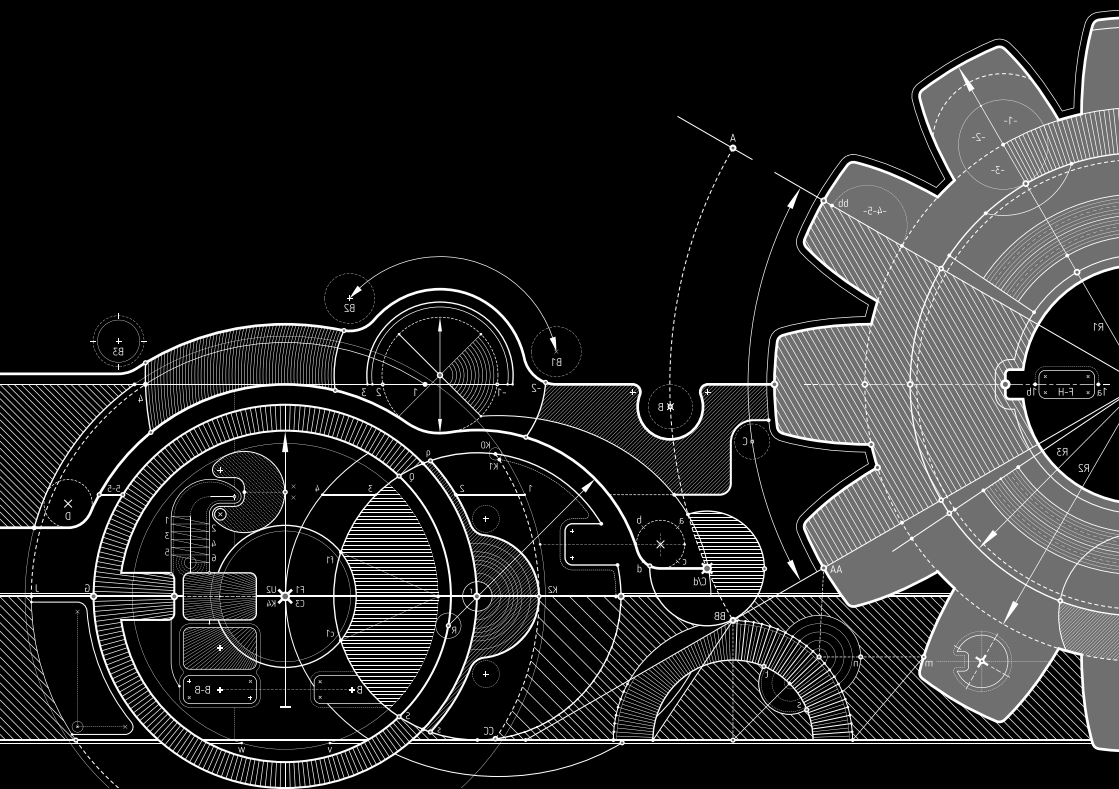


Key outcomes

- The use of computer vision and other forms of AI in detecting explosive ordnance is a groundbreaking development.
- Innovative algorithms with impressive capabilities have been developed recently. The algorithms also address the inherent weaknesses in data collection by giving control back to the user, rather than it being dictated by the algorithms.
- Cloud-based tools have the potential to transform the traditionally resource-intensive task of drone image analysis into a more accessible and efficient process, compatible with the use of off-the-shelf unmanned aerial tools.
- Automated visual detection using synthetic training data has shown very successful results.

4. CONFERENCE SESSIONS

4.3 SPEED-PITCH SESSIONS



4.3 SPEED-PITCH SESSIONS

Short presentations on technologies and innovative ideas / projects were given by a variety of exhibitors. The following criteria were applied to the sessions:

- The exhibitors had been selected before the conference.
- They were given five minutes for their presentations.
- No questions were permitted during the session, but subsequent bilateral follow-up at the exhibitor's stand (see section 5) was encouraged.

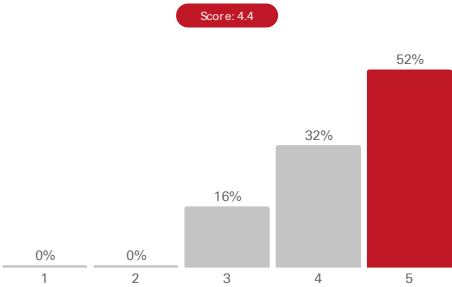


List of presenters and their topics:

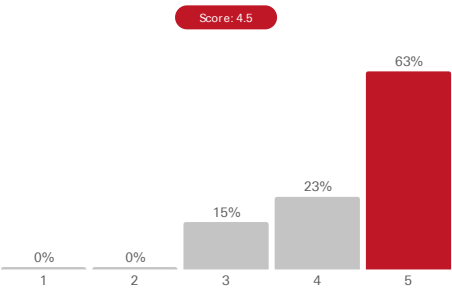
- **Alford Technologies:** Project Yellowstone update
- **Aerobotics 7:** AI-powered platform to detect and identify landmines and explosive remnants of war
- **AMAK (Al-Mayadeen Al-Khadhraa):** Watchful Eye – A landmine warning application
- **Anna Mansueti:** Demining reimagined
- **Danish Refugee Council, Ukraine:** Enhancing EORE messaging through augmented reality
- **Disarmament Solutions:** Sustainable destruction technology and mine action capacity building in Ukraine
- **Force Ware GmbH:** The protection boot BCB2, the mine protection suit MPS2 advanced, and the demining suit MPS2
- **Innovative Operations Systems. Inc.:** Demining robot 'DMR' – Small minefield excavator
- **VEA Systems Consortium:** Mapping of field contamination for agrarian mine action
- **DXN EOD Technology Co., Ltd.:** Laser application for landmines / unexploded ordnance
- **MiFi Maps:** Comprehensive accuracy for mine action
- **SAFER:** SAFER shoes – Anti-mine / improvised explosive device personal protective equipment
- **Snail Aid – Technology for Development:** Disarmadillo+
- **White River Technologies, Inc. and UXO XYZ Robotics:** Combined 3-dimensional electron microscopy (3DEM) sensing and robotics



63 participants ranked the speed-pitch session on day 1:



40 participants ranked the speed-pitch session on day 2:





5. EXHIBITION

For more information on technologies and innovative ideas/projects presented at the conference, please scan the QR code or visit our innovation conference webpage: <https://www.gichd.org/the-gichd/events-training/innovation-conference-2023/>



Aerobotics7
<https://www.aerobotics7.com/>



Alford Technologies
<https://www.explosives.net/>



AMAK
(Al-Mayadeen Al-Khadhraa)
<https://almayadeen-ngo.org/en/>



Anna Mansueti, Editor, Bomb Techs
Without Borders and Platinum East
<https://www.bt wob.org/>
<https://platinumeast.org/>



BCB International Ltd
<https://www.bcb in.com/>



CEIA SpA
<https://www.ceia.net/>



Chemring Energetics UK
<https://www.chemring.com/>



Danish Refugee Council
<https://pro.drc.ngo/>



Disarmadillo+
<http://www.snailaid.org/>
<https://www.iit.it/>



Disarmament Solutions
<https://www.disarmamentsolutions.com/>



DXN EOD Technology Co., Ltd
<http://dxnlaser.com/>



Ebinger Prüf- und
 Ortungstechnik GmbH
<https://ebingergroup.de/>



EODynamics
<https://www.eodynamics.co/>



Esri Inc. and Esri Schweiz AG
<https://www.esri.com/en-us/home>
<https://www.esri.ch/de-ch/home>



ETH Zürich
<https://asl.ethz.ch/>
<https://rsl.ethz.ch/>



Force Ware GmbH
<https://www.forceware.de/en/>



GARANT
<https://garant-protection.com/>



Global Clearance Solutions AG
<https://gcs.ch/>



Improtex Industries LLC
<https://itb.az/>



Innovative Operations Systems. Inc
<https://ios-robot.com/en>



Institut Dr. Foerster GmbH
 und Co. KG
<https://www.foerstergroup.com/en/>



MESAN Elektronik Sanayi Ticaret AŞ
<https://www.mesanas.com.tr/>



MiFi Maps
<https://mifimaps.com/>



Mine Action Centre of Serbia and the
 Academy of Applied Technical and
 Preschool Studies
<https://czrs.gov.rs/en/home/>
<https://international.akademijanis.edu.rs/>



Mine Kafon
<https://minekafon.org/>



Radiodetection Ltd, Schonstedt and
 Sensors and Software Inc
<https://www.radiodetection.com/en>
<https://www.schonstedt.com/>
<https://www.sensoft.ca/>



Remoquip
<https://remoquip.com/>



SAFER
<https://www.safer-innovation.com/>



SEFOR Solutions, sro
<https://sefor.cz/en/home-english/>



Tetra Tech
<https://www.tetrattech.com/>



UXO XYZ Robotics
<https://www.uxoxyz.com/>



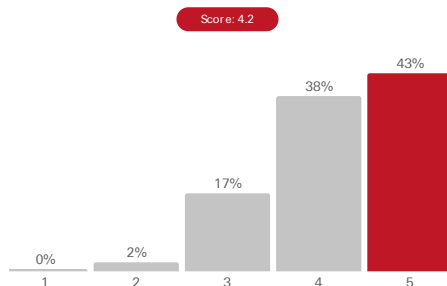
VEA Systems Consortium
<https://veasystems.com/>



White River Technologies
<https://whiterivertech.com/>



65 participants ranked the exhibition hall:





6. CLOSING REMARKS BY AMBASSADOR STEFANO TOSCANO

Dear colleagues and friends,

As the curtain falls on this extraordinary gathering of innovative minds, I am filled with a profound sense of gratitude and inspiration. I want to thank you all for your active participation and valuable contributions over the past three days.

From cutting-edge technology to novel discussions on concurrent topics, we have explored the frontiers of innovation to further advance explosive ordnance risk reduction. The energy in this room reflects our shared commitment to making communities safer. Reflecting on our discussions over the past three days, I hope that we have developed a common understanding of what innovation is.

I think that it is fair to say that we have collaboratively and broadly defined innovation as efforts that drive progress, improvement and learning by addressing real needs and adding sustained value. We have also highlighted the importance of disruptive innovation, or dramatic change, propelled by transformative forces such as artificial intelligence, new solutions and paradigm shifts.

We have also discussed and acknowledged many challenges including those related to funding, coordination mechanisms, resistance to change and operation within legal and normative frameworks. But let us remember: these challenges are hurdles that we have the shared responsibility to address and overcome.



The way forward for innovation is “together”, and I am inspired by the collaboration and knowledge exchange that I have seen over the past days. Thank you again for this collective work.

Dear colleagues,

Allow me to share with you what I believe are three simple yet profound messages that have emerged during the conference.

The first is that listening is innovative, and if we want to be interesting, we must be interested. This seems simple at first, but real listening takes time and sometimes requires new ways of working. It is a genuine interest in others, however, whether they be colleagues, investors or the communities that we serve, that will lead to solutions that are needs-based and viable.

The second message is that we need to communicate in ways that engage all actors. We have heard this in several sessions, in relation to ensuring that risk education really means something to communities or learning to speak the language of the finance sector. To be innovative, we need to communicate with those beyond our sector. This is not

just a question of avoiding acronyms. To bring new partners along with us, we need to see our shared priorities and find ways to understand one another – a basic premise for real collaboration.

The third message is that genuine curiosity is necessary to drive innovation. We must be willing to ask the right questions – questions that may be challenging. This includes questioning our own ideas and being open to the questions of others. This curiosity is key at every stage of the innovation process.

Thus the key messages are: listening; communicating in a way that you will be understood, simply; and being curious and open to revision, the very definition of science.

In our sessions, we have emphasised the symbiotic relationship between standards and innovation, and norms and innovation. Standards and norms serve as the bedrock upon which advancements flourish, playing a crucial role in fostering innovation. This morning the Global Framework for Through-life Conventional Ammunition Management was presented as an outstanding recent example of how the international community can work

collaboratively to come up with a framework that is both innovative in itself and will support further innovation.

As you know, the GICHD actively supports the revision of the existing IMAS and the development of new standards. We assist national authorities and other stakeholders in reviewing and developing national mine action standards based on the principles of the IMAS and good practices.

At the GICHD, we have recently established a Research and Innovation Programme. This programme is dedicated to fostering a culture of innovation based on the insights gained from sessions like those that we have had over the past three days. The GICHD Research and Innovation Programme will continue to engage with and listen to you, check its communication for relevance and ask pertinent questions. This is the future, and we would very much like you to be a part of it.

During our discussions, we have explored strategies to prioritise needs-driven research and innovation. Several interventions and some feedback identified the lack of coordination and collaboration as being among the challenges to innovation. It is crucial that we effectively identify and communicate challenges, draw inspiration from successful models and consider the establishment of multi-stakeholder advisory bodies. Ensuring the continuous coordination of actors working upstream and downstream is important in order to have a



multiplying effect on all the fantastic innovative initiatives showcased during the breakout and speed-pitch sessions. We will also continue to insist on the relevance of our sectors to broader agendas, which is an innovative approach in itself that has started to gain steam in recent years. The GICHD remains very much committed to this. So, let us focus on coordination and collaboration.

Following this conference, the GICHD aims to create an Explosive Ordnance Risk Reduction Innovation Hub, which will follow up some of the discussions that we have had here and enable ideas to become practice. The Explosive Ordnance Risk Reduction Innovation Hub is planned to be an open, multi stakeholder collective, comprising experts from research and technology organisations, academia, national mine action authorities, mine action operators and donors.

The Explosive Ordnance Risk Reduction Innovation Hub will also help us shape the next Innovation Conference, where GICHD will continue providing a platform for sectors to exchange ideas.

Dear colleagues,

As we leave this conference centre and return to our respective corners of the globe, let us carry the spirit of collaboration with us. The challenges ahead are great, but so is our collective capacity for innovation and problem-solving. Innovation cannot happen in a bubble, and it is my hope that the connections forged at the conference will serve as the foundation for future collaboration, pushing the boundaries of what is possible in the realms of explosive ordnance risk reduction.

Ours is not a one-off effort, but rather the result of an iterative process that counts on the commitment of all, drawing on the lessons learnt. So, in closing, I ask you to keep two questions in mind: What would you like to see as you continue to engage in shaping innovation

in explosive ordnance risk reduction? And what can you contribute to shaping innovation in explosive ordnance risk reduction?

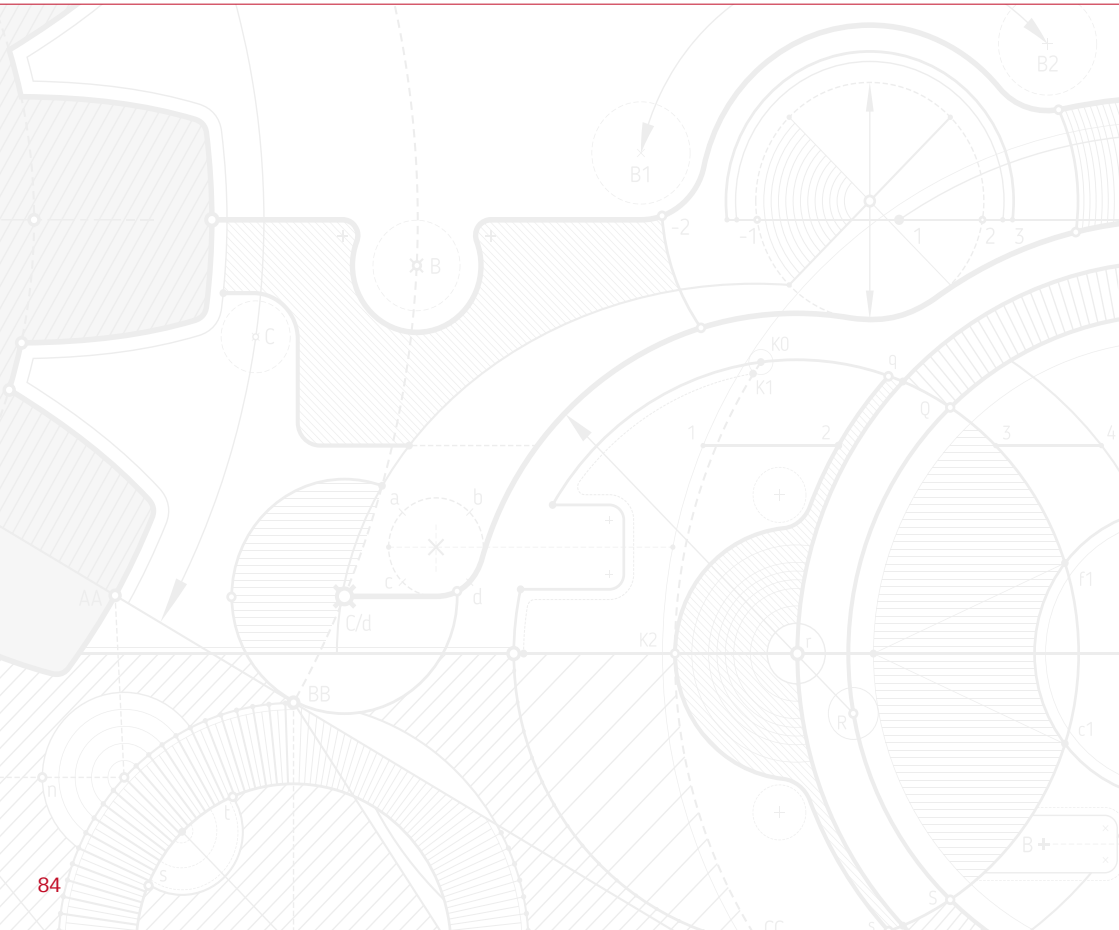
With your answers in mind, I challenge you to continue the dialogues and nurture the relationships that have begun here and to apply to your work the insights that you have gained. We must accelerate progress in our journey towards a safer and more resilient world; millions of people in affected States around the world are counting on us.

Finally, I want to reiterate my heartfelt gratitude to all those who contributed to the organisation of this event — the participants, the exhibitors, the panellists, the moderators and, of course, the organisers. Thank you all for your valuable

contributions and commitment, which have undoubtedly made this gathering a memorable and impactful experience.

A special and warm appreciation goes to Alain Nellen for his exceptional dedication in bringing this event to fruition. Alain, your efforts have truly made this event a success, and I am sincerely thankful for your hard work and commitment!

Thank you all once again for being part of this incredible conference. Safe travels, and may the innovative spirit ignited here guide your endeavours in support of our shared noble cause.



ANNEX: AGENDA

		AGENDA 14 TH TO 16 TH NOVEMBER 2023, GENEVA, SWITZERLAND	
DAY 1 (14th November)		DAY 2 (15th November)	
TIME	SESSION	TIME	SESSION
09:00 - 10:00	Registration	09:00 - 10:45	<i>Plenary: Innovative Finance (Room A)</i>
10:00 - 10:45	Opening Remarks Setting the Stage / Framing the Issue	10:45 - 11:15	Coffee Break / Exhibition
10:45 - 11:15	Coffee Break / Exhibition	11:15 - 13:00	<i>Plenary: Technology Prioritisation: A Needs-based Approach (Room A)</i>
11:15 - 13:00	<i>Plenary: Connecting the Dots between Innovation and Standards (Room A)</i>	13:00 - 14:30	Lunch
13:00 - 14:30	Lunch	14:30 - 15:15	Speed Pitch Session (Room A)
14:30 - 15:15	Speed Pitch Session (Room A)	15:15 - 16:15	Breakout Session 4 Simultaneous Themes: <ul style="list-style-type: none">– Innovative Finance of Mine Action in Agriculture Development Initiatives (Room A)– Exploring Spatial Computing Technologies in Support of Operations (Room B)– Test & Evaluation of UAS based Remote Sensing Technologies (Room C)– Integrated Digital Solutions for EORE (Room 4)
15:15 - 17:00	<i>Plenary: Harnessing Social and Behaviour Change Communication (SBCC) (Room A)</i>	16:15 - 16:30	Coffee Break / Exhibition
ICE-BREAKER EVENT		16:30 - 17:30	Breakout Session 4 Simultaneous Themes: <ul style="list-style-type: none">– Utilising Remote Sensing and Geospatial Artificial Intelligence (Room A)– Advances in Explosive Detection Technologies (Room B)– Exploring Environmental and Climate Change Mitigation Practices (Room C)– Challenges of Underwater EO Contamination (Room 4)
17:00 - 17:30	Exhibition		
17:30 - 19:00	Reception		
DAY 3 (16th November)			
TIME	SESSION		
09:00 - 10:45	<i>Plenary: Advancing Ammunition Management through Innovative Approaches, Tools and Technologies (Room A)</i>		
10:45 - 11:15	Coffee Break / Exhibition		
11:15 - 12:15	Breakout Session 3 Simultaneous Themes: <ul style="list-style-type: none">– Better Data Quality for Better Results (Room A)– Community Resilience Initiatives towards Climate Change (Room B)– Developments in Artificial Intelligence Applications (Room C)		
12:15 - 13:30	Lunch		
13:30 - 15:15	<i>Plenary: Agricultural Land Release in Ukraine: Outcome-based Solutions (Room A)</i>		
15:15 - 16:00	Closing Remarks		
		<i>End of Conference</i>	

LOCATION

Conference location:

[International Conference Centre Geneva \(CICG\)](#)
Rue de Varembe 17
1202 Geneva
Switzerland



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