Melchior

Newsletter

Issue 3 - January 2025

Introducing the world of mechanical impedance and multi-physics technologies

Funded by the European Union

Welcome

Welcome to this issue of the MELCHIOR Newsletter.

MELCHIOR project is pleased to present to you three more Partner Profiles of some of the key members of the project's consortium - the **Spanish Ministry of Interior, the Spanish Institute of Aerospace Technique (INTA),** and **Microflown Technologies**.

In this newsletter, there is also an interesting article by Mike Ellis from CBRA in collaboration with the Retired Assistant Director of Police at INTERPOL, who gives an insight into the world of sports stadiums and the enormous potential for the MELCHIOR technologies in this sector.

News and updates from MELCHIOR Partners are highlighted in this issue. If you are interested in receiving the project's updates next time, please send an email at melchior-newsletter@cross-border.org .

Sports Security – The Unseen Layers

In this third edition of the MELCHIOR newsletter, we delve deeper into how the new and innovative technology will bring safer ways in which individuals are scanned for weapons, drugs or other illicit goods concealed on or inside the body, and particularly what this could mean for sports security.

Major international events, including cultural, social, religious, and sporting tournaments, pose significant challenges for policing and security experts. Host countries must balance the complex task of organizing a smooth, successful event while ensuring the safety of participants and spectators.

This requires an intricate police and security response, especially as each country hosting a major international event will be under the scrutiny of the Global media, and therefore of course want and expect their event to pass trouble-free.

Behind the scenes

But have you ever considered the effort and multi-layers needed to create a safe environment for a major sporting event? Imagine the 'behind the scenes' effort that need to happened in order to ensure that each sporting event will be safe.

In the past, there have been notable examples where situations have escalated, such as the tragic events at the Munich Olympic Games in 1972, when athletes and trainers were taken hostages by a terrorist group, resulting in a deeply unfortunate outcome.

It is now a well-established practice that following every public sporting event, valuable lessons will be learnt not only for the host country, but for others who will host similar events in the future, and therefore the importance in capturing best practices and lessons learnt before, during and after such major international events remains a priority. The same was said for this year's summer Olympics in France where a widespread, organised and concentrated attack on the country's rail network preceded the opening ceremony.

These best practices have evolved following international and regional efforts by sports federations, private entities and through Government intervention. It is now widely recognised that enhanced security measures intended for sports events should cover not only the actual arenas and venues, but also border crossing, transportation systems, open spaces, cultural and tourist areas.

The physical implementation of integrated risk assessment processes, recommended for major sporting events is highlighted by the UN Global Counter-Terrorism Strategy (UNGCTS) adopted by the UN General Assembly in 2023, which calls on all states to improve the security and protection of vulnerable targets, including sports events, in line with the UN Security Council Resolutions (UNSCRs) 2178 (2014), 2341 (2017), 2396 (2017), 2482 (2019) and 2617 (2021).

National security will involve subject matter experts operating in many areas creating a workforce taken

from National, International and local agencies. Security operators in the field will have skills covering all areas, from intercepting counterfeit merchandise, to preventing human traffickers, direct terror attacks, crowd control and traffic management.

Operating seven days a week and fifty-two weeks a year, teams of experienced security experts will be at hand to ensure everything passes calmly, and this requires weeks, months and even years of preparation and planning.

Hidden teams of highly trained and dedicated officers, agents and civilians from many law enforcement agencies including Police, Customs and Border Protection and military components will work together to ensure a safe and secure event for all to enjoy. By using well-established multi-agency relationships, they will try to foster partnerships with National and local law enforcement agencies.

The Total Team Effort

- **Venue**

Part of the protection of a major sporting event venue will include checking individuals and vehicles entering or leaving the venue area, including lorries and other vehicles carrying food and beverages, television equipment, furniture. The security teams may utilise large, portable X-ray trucks, known as Vehicle and Cargo Inspection Systems, and other technologies that include facial recognition, handheld body scanners, explosive detector dogs etc. Special operators for this type of event could include members of tactical firearms teams and the border patrols, trauma and rescue teams.

- **Ground Defence**

Another major consideration when hosting a major sports event will include offensive and defensive security coordinators with specialist teams working in the months and weeks leading up to the event. These will be practising emergency scenarios, coordinating information coming in from intelligence agencies and establishing operating procedures used in coordinating the respective enforcement teams, air support, boat crews, X-ray operators and other specialists working at the event. Maintaining a central control hub for information gathering, coordinating and distributing intelligence between all stakeholders and law enforcement partners, is an essential component to providing a security curtain.

- **Air**

For some major events Air Operations will bring in aircrews, helicopters and aeroplanes to help keep an eye on activities from above. Using significant technological capabilities, Air Operations can provide secure tactical communications and surveillance capabilities utilising helicopters or fixed wing aircraft, from which radar and camera operators can provide other law enforcement operators with clear, live video images of what is happening at any number of areas within the event venues and the surrounding area. Ariel operational command centres can coordinate communications between enforcement and military security professionals using their multiple crews flying planes and helicopters that monitor and secure the airspace around the stadium, conduct aerial surveillance, and coordinate command and control for non-defence assets. If any unauthorised aircraft enters into a temporary flight restriction area, then all agencies can be updated of the threat risk and in some cases a qualified intercept may be authorised.

- **Sea**

In some circumstances depending on the location of the major sports event, boat crews will be involved in providing security by patrolling the coast and boarding any boats that may seem suspicious or out of place. For example, a boat that is running low in the water may be an indicator that something suspicious might be hidden inside that the boat operator is trying to conceal. Providing a security barrier in a maritime environment can be extremely difficult and requires a highly skilled response.

An integrated approach

The Council of Europe's Saint-Denis Convention promotes the importance of a balanced and integrated approach for securing sporting events, covering three overlapping pillars:

- **Safety**
- **Security**
- **Service**

Together these elements help to ensure a safe, secure and welcoming environment for participants at sports events, both inside and outside of the arenas. Six key factors provide the joined-up approach, namely efforts by government, municipal authorities, police, sporting authorities, supporters and the local communities.

This integrated approach – safety, security and service measures – should be applied not only inside, but also outside of sports venues to ensure that risk assessment and security measures take account of the journey to and from the stadium.

Therefore, of great importance for the deployment of the MELCHIOR technology will be understanding how crowd control moves from the initial stage of '**Ingress'** (identified as the start of journey) to the concourse perimeter entry points, known as 'Circulation' (meaning from the gates around the stadium, including at half time and during the event) and finally to **'Egress'** (meaning the departure from stadium towards transport).

From planning to operation, it's important to ensure a positive experience for all participants while mitigating the different risks and threats, notably the terrorist attacks.

Introducing the MELCHIOR technology in sports events

Spectator compliance is almost assured in the modern era, as people attending sports arenas are familiar with the 'inconvenience' of passing a security check, where they comply with a physical search or scanning with a detector wand.

This type of search often brings with it negative consequences and is frequently regarded as both invasive and disruptive to individual privacy. It may create tension and stress among passengers, who can be left waiting in extended queues as the security process slows the movement of crowds.

International major event security experts, who provide expertise to facilitate support and cooperation for major international event policing, have consistently agreed that crowd control at sports events presents obvious challenges. These challenges arise whether during opening ceremonies, in fan festival open areas, as crowds travel to events, or when they gather without tickets outside stadiums.

However, the innovative MELCHIOR technology aims to improve the experience for the visitors entering sports arenas. This is because the system's infrasound mechanical impedance interrogation technology is complemented by other harmless and non-contact technologies, meaning that no personal contact with spectators is required by security officers. Unless identified as a threat by the technology, fans will not need to undergo a physical search.

Enduring the long queues associated with traditional security screening is therefore likely to become a past situation with this new security technology. Unlike traditional metal detectors, the MELCHIOR system uses technology posts and panels that visitors walk through to be scanned, significantly speeding up the process. While visitors will still likely need to move in a single line through a scanning cabinet, the screening should be much faster and less intrusive.

Risk assessments, planning, and communication will always remain essential aspects of securing major sports events, alongside the need to anticipate evolving situations and provide real-time updates to all stakeholders to ensure they understand the immediate threat levels. However, one aspect of crowd control at sports events may be improved and expedited with the deployment of MELCHIOR technology.

Balancing safety management and spectators' expectations with the introduction of new screening devices

To ensure that spectators and staff will remain safe and secure, it is essential to achieve the right balance between the actual infrastructure of the stadium and any safety management systems being deployed. Safety management systems should be designed to take advantage of strengths of the stadium's physical infrastructure and compensate for its weaknesses.

This means the identification of so-called **'soft targets'** where the frequent presence of large numbers of people or spectators, and the simultaneous absence or low level of security to protect them against violent attacks, is present. This could be in both open spaces or enclosed areas which are open to the public, presenting potentially suitable targets for attackers or terrorists due to the high concentration of people.

The challenge therefore for MELCHIOR end users may be to balance these elements in the sporting environment - meaning security needs cannot be treated in isolation. The physical deployment of the technology needs to be customised to meet security needs, while complementing the need to ensure spectator compliance.

Events

The MELCHIOR project has been actively participating in key events to share its advancements and foster collaboration within the research and security community. These engagements provide valuable opportunities to highlight the project's innovative work, exchange knowledge, and strengthen partnerships. Here's a glimpse into our recent participation in notable events.

Explosives Detection Joint Workshop

In April 2024, the MELCHIOR project co-organized the "Explosives Detection Joint Workshop", which was held in Athens, Greece. This collaborative event, co-organized by the ODYSSEUS Project, the INHERIT H2020 Project, and the MELCHIOR Project, showcased the strides made in explosives detection technologies.

Jose Luis Perez-Diaz, the Project Coordinator, delivered an insightful presentation detailing MELCHIOR's objectives and technical framework, providing attendees with a comprehensive understanding of the project's innovative approach. Additionally, the Project Manager Mirela Rosgova (KEMEA) effectively represented MELCHIOR, highlighting the project's main aspects.

MELCHIOR project in the "Explosives Detection Joint Workshop"

Detection Hub Initiative

MELCHIOR project is proud to be part of the Detection Hub, which is a joint initiative from multiple EU-funded projects, focusing on the organization of collaborative events & workshops on their main thematic categories, which are the detection of drugs, explosives, weapons, and illicit goods. The Detection Hub facilitates joint events and workshops, enabling synergies among cutting-edge initiatives in the security domain.

The first Detection Hub Workshop: Clustering Innovative Scientific Approaches to Enhance the Detection of drugs, explosives, and illicit goods, was held in Madrid, Spain, at the CETSE premises. The workshop featured insightful presentations from the organizing projects, multi-sectoral panels focused on detection and procurement topics, and discussions on upcoming opportunities for EU-funded research and innovation in civil security and border management. The MELCHIOR project was presented by Julio César Saavedra González. Moreover, the project's coordinator, Jose Luis Perez-Diaz, participated in the first panel: "Innovation Procurement for Detection: Bridging theory and practice" and shared insights on overcoming procurement challenges in detection innovation.

MELCHIOR project in the Detection Hub Workshop: Clustering Innovative Scientific Approaches to Enhance the Detection of drugs, explosives, and illicit goods.

Synergies

The MELCHIOR project continues to expand its impact by fostering meaningful collaborations with other groundbreaking initiatives. These synergies not only amplify the project's capabilities but also contribute to shared goals in enhancing security and innovation across Europe. Below, two key partnerships that demonstrate MELCHIOR's commitment to advancing cutting-edge solutions for a safer future are highlighted.

TENACITy Project

TENACITy Project aims to enhance travel intelligence for fighting crime and terrorism in the European Union. Its vision was born as a Travel Intelligence Governance Framework that will incorporate a holistic approach to crime prevention, strengthening the intelligence, the analytic capacity and the decision-making of the security authorities. More specifically, this vision in fighting serious crimes and reinforcing the position and the cooperation of authorities will be achieved through modern and effective tools for exploitation of travel intelligence data, and through training and sensitization of law enforcement personnel.

Find more information about TENACITy here: https://lnkd.in/dMchRzS8

METEOR Project

MELCHIOR project has established a synergy with the METEOR project. The METEOR project pioneers in the utilization of vapour-based technology, achieved by collecting a sample of air representative of the container's interior and subsequently analysing its chemical content. It is non-destructive, can be designed to be minimally intrusive and safer for the screener, and has the potential for complete automation, eliminating the need for human interpretation. This technology aims to enhance the efficiency of current screening methods, enabling customs agencies to inspect more containers, contributing to increased border security, and ultimately, safeguarding citizens and infrastructure.

Learn more about the METEOR project here: https://lnkd.in/dUG5g5EU

Introduction to the MELCHIOR Consortium

The MELCHIOR Consortium consists of 15 partner organisations from 9 European countries. In each issue of the Newsletter we will introduce three of our partners – Issue 3 covers the end user MININ, technology partner Microflown and research partner INTA.

The Spanish Ministry of Interior (MININT) plays a crucial role in MELCHIOR, serving as a primary end-user partner. This governmental body, which encompasses the National Police, Guardia Civil, and prison services, is tasked with ensuring public safety and border security across Spain. Their involvement in MELCHIOR is not only about testing and validating the technology but also about providing critical insights into its practical applications. By leveraging decades of operational experience, MININT helps align the project's innovative detection technologies with real-world requirements.

A standout feature of MININT's participation is the commitment to enhancing the detection of hidden contraband. Currently, standard tools like metal detectors are limited in their ability to identify non-metallic objects such as small electronics, plastic-wrapped drug packets, and other non-metal threats. MELCHIOR's use of infrasound technology presents a groundbreaking opportunity to overcome these limitations. Angel López, a seasoned expert with over 30 years of experience in the prison service, emphasizes the transformative potential of this technology for controlling entry into high-security facilities. "The ability to detect even the smallest concealed objects without halting the flow of people is key to improving both security and operational efficiency," López states.

MININT is also involved in organizing tests across different settings, including prisons and the Madrid airport, which will simulate the diverse environments where MELCHIOR technologies may be deployed. Their feedback is instrumental in fine-tuning the prototypes to meet the strict regulatory and operational standards required for public use. Collaboration with MELCHIOR's technical teams has also been a highlight for MININT, fostering a strong relationship between end users and technology developers. José T. Romero, another key representative, notes the positive interactions with the technical teams, emphasizing their responsiveness to end-user feedback and their commitment to developing harmless, effective solutions.

The Ministry's deep involvement in previous European projects, including MESMERISE and COSMIC, brings valuable expertise to MELCHIOR. Their participation underscores the critical need for innovative, ethical, and non-invasive technologies that can adapt to the complex demands of modern security environments.

Microflown Technologies is a world leader in acoustic sensor technology, and its role in MELCHIOR is integral to the project's success. As the only manufacturer of MEMS-based particle velocity sensors capable of detecting infrasound, Microflown provides a unique technological advantage. Dani Fernández Comesaña, CEO of Microflown, explains that their sensors are designed to measure minute acoustic signals with unparalleled precision, making them ideal for detecting concealed objects such as weapons and explosives.

Microflown's expertise lies in infrasound detection, which forms the backbone of MELCHIOR's non-invasive scanning technology. These sensors enable the system to identify anomalies in sound waves caused by hidden objects, providing a safe and efficient alternative to traditional methods. The development of these sensors is a complex process that involves advanced calibration techniques and collaboration with academic partners like the Technical University of Munich (TUM). Fernández notes, "One of the most exciting aspects of this project has been working with TUM to model how sound interacts with the human body, which has led to significant improvements in sensor performance".

The company's involvement extends beyond sensor development to include real-world testing and integration. By participating in field trials at borders and airports, Microflown ensures that their technology meets the stringent requirements of operational environments. These tests not only validate the sensors' capabilities but also provide valuable data for refining the system's overall performance.

Microflown's participation in MELCHIOR builds on its extensive experience with Horizon 2020 projects, including ROMSOC. This project focused on developing simulation tools to predict sensor performance under various conditions, a capability that has been directly applied to MELCHIOR. For Microflown, the ultimate reward lies in seeing their sensors deployed at scale, revolutionizing the way security inspections are conducted. Fernández envisions a future where these technologies enhance public safety while respecting individual privacy, setting a new standard for non-invasive detection methods.

As one of Spain's premier research institutions, **the National Institute for Aerospace Technology (INTA)** brings unparalleled expertise in energetic materials and threat detection to the MELCHIOR project. Headquartered within the Weapons Systems and Ballistics Department, INTA's contributions span from theoretical studies to hands-on testing, ensuring the project's technological solutions are both robust and practical. Captain José Ángel González, who leads the Energetic Materials Area, describes their role as multifaceted: "We contribute not just through the synthesis of explosives for testing but also by ensuring that the anti-blast technologies meet rigorous European certification standards".

One of INTA's primary tasks is to support the development and testing of MELCHIOR's blast-proof cabins. These cabins, designed to detect and mitigate threats such as hidden explosives, are critical to the project's goal of enhancing safety without sacrificing efficiency or privacy. INTA's work involves simulating various threat scenarios and validating the equipment's detection capabilities in controlled environments. Their efforts will culminate in a series of tests that assess the cabins' effectiveness against a range of explosive materials and configurations.

Beyond the technical aspects, INTA is deeply invested in the ethical implications of their work. By improving detection capabilities while minimizing physical contact, they aim to create technologies that respect individuals' privacy and dignity. Captain González highlights the importance of these advancements for border security and the traveller experience, particularly in crowded and high-risk areas like airports.

INTA's history of involvement in European research projects, including MESMERISE and EXERTER, positions them as a seasoned and reliable partner. Their ongoing participation in projects like HITDOC and GENIUS further demonstrates their commitment to advancing security technologies at both the national and international levels. With a strong foundation in research and innovation, INTA continues to play a pivotal role in MELCHIOR's mission to revolutionize border security through non-invasive methods.

Melchior Newsletter

Issue 3 - January 2025

Introducing the world of mechanical impedance and multi-physics technologies

The official newsletter of the MELCHIOR Horizon Europe project is available at https://melchior-project.eu

Editorial team
Cross-border Research Association, Switzerland
Center for Security Studies, Greece
University of Alcalá

MELCHIOR Online Presence

Contact
melchior-newsletter@cross-border.org

Funded by the European Union