NATO OTAN

SCIENCE FOR PEACE AND SECURITY (SPS) PROGRAMME

Practical Cooperation with Croatia

NATO SPS Information Day in Croatia

8 April 2022

Sveučilište u Zagrebu
University of Zagreb

REPUBLIC OF CROATIA
Ministry of Foreign and European Affairs

Introduction by David van Weel

As an established brand for NATO, the Science for Peace and Security (SPS) Programme fosters civil security-related practical cooperation and dialogue between NATO and partner countries based on scientific research, technological innovation and knowledge sharing. The Programme offers funding, expert advice and support to tailor-made, non-military activities that respond to NATO's strategic objectives. A vast network of universities and institutions across the world are participating in SPS activities, which bring together scientists, experts and policy makers in an effort to address mutual security challenges and contribute to technical and scientific advancement.

In the framework of the SPS Programme, it is important to recognize Croatia's contribution to a wide range of security-related areas, such as Counter-Terrorism, Cyber and CBRN Defence, Energy and Environmental Security, Advanced Technology, Mine and Unexploded Ordnance Clearance and Detection, as well as Hybrid Challenges. The outcomes of these activities have enhanced scientific know-now through research and development, sharing of best practices, and exchange of knowledge with NATO and partner nations. For instance, Croatian scientists designed and fabricated a state of the art radiation detector in cooperation with peers from Australia and Japan. Building on this successful cooperation, the follow up project 'E-Sicure2' is furthering this research by focusing on a semiconductor-based sensing device capable of identifying explosive and special nuclear materials. Furthermore, the joint efforts of Croatian and Israeli experts have led to the organization of three editions of the Zagreb Security Forum, with support from SPS. Addressing topics such as critical infrastructure protection, resilience, and hybrid threats, these events have turned into an excellent avenue for case study analyses, policy debates and the creation of a regional network of experts in East and South Eastern Europe.

Croatia has also championed regional cooperation via a number of SPS activities developed with Allied and partner countries from the Western Balkans. Together with Bosnia and Herzegovina, Montenegro and North Macedonia, Croatia has successfully deployed and implemented the Next-generation Incident Command System (NICS), a web-based command and control software that facilitates collaboration across all levels of preparedness, planning, response and recovery

during natural disasters and other incidents. Moreover, researchers from Croatia and Bosnia and Herzegovina have developed and tested a novel method to detect landmines by using honeybees. This innovative approach is expected to make detection less costly and time-consuming, and has the potential to be further applied in humanitarian demining. Finally, Croatian scientists are also working with Serbian counterparts in the development of a multispectral surveillance camera, which will cover ultraviolet (UV), visible and infrared (IR) radiation. The tangible results of these projects did not only contribute to advancing security-relevant science, but also to highlighting the value of these research collaborations thanks to their high visibility in local and international media.

There is a lot more to say about Croatia's involvement in the SPS Programme – this is why we are here. Therefore, this SPS Information Day is the right occasion to find out more about the SPS Programme, take stock of ongoing cooperation with Croatia, and explore potential new activities by engaging with experts and building new networks. As SPS enjoys a high public diplomacy value, this event is also an opportunity to reflect NATO's commitment to cooperative security, the importance of partnerships, and the benefit of cooperation. In this light, the SPS Information Day is also marking the launch of the 'WE ARE NATO' campaign in Croatia.

I invite you all to make use of this event in the best way possible and I hope that it will lead to fruitful discussions, new ideas and successful collaborations.

David van Weel
Assistant Secretary General
NATO Emerging Security Challenges Division

The Science for Peace and Security (SPS) Programme team with ASG ESC David van Weel and Deputy ASG ESC James Appathurai

About the SPS Programme

The NATO Science for Peace & Security (SPS) Programme enhances security-related civil science and technology to address emerging security challenges and its impact on international security. It enables scientists, experts and officials from Allied and partner countries to work together to address these challenges. To this end, the Programme provides funding and expert advice for security-related activities through four established grant mechanism: Multi-Year Projects (MYP), Advanced Research Workshops (ARW), Advanced Training Courses (ATC), and Advanced Study Institutes (ASI). SPS activities are demand-driven, modular, and designed to meet the requirement of the nation(s) and end-user(s). All SPS activities contribute to the NATO's strategic objectives, have a clear link to security, and respond to at least one of the SPS Key Priorities.

The SPS Programme also has a high public diplomacy value for NATO, providing the Alliance with separate, non-military communication channels by bringing together experts from NATO and Partner countries, often in situations or regions where other forms of dialogue, more directly focused on defence and security, are difficult to establish. Accordingly, the Programme enables NATO to become actively involved in such regions, often serving as the first concrete link between NATO and a new partner.

SPS links the scientific community to NATO through civil science cooperation activities in security-related fields such as Counter-Terrorism, Cyber Defence, CBRN Defence, Energy Security, Climate Change Security, Advanced Technology (EDTs, Data, AI), Mine and Unexploded Ordnance detection and Clearance, and Human and Social Aspects of Security. Civil actors, including researchers, academics and government experts play an important role in helping the Alliance identify, understand, and respond to contemporary vulnerabilities and threats. SPS offers unique ways to engage NATO nations and partners in meaningful, practical cooperation with concrete results and deliverables contributing to technical and scientific advancement.

Since the Programme's inception, a wide international network of scientists and experts from NATO member and partner nations has been established. Every year, approximatively 2000 experts participate in SPS activities and help to build capacity in partner nations, support NATO efforts in the fight against terrorism, facilitate the development of security-related advanced technologies and foster expert networks to address questions related to cyber defence or the role of women in peace and security. More than 20 Nobel Laureates have been involved in the SPS Programme, a testament to the scientific excellence supported by the SPS Programme. Young scientists are also actively supported through SPS activities, which contribute to broaden their professional network and scientific expertise.

SPS Grant Mechanisms

The SPS Programme supports collaboration through four established grant mechanisms. Interested applicants must develop a collaborative activity that fits within one of these formats.

1

Multi-Year Projects (MYP)

WHAT
Research and Development (R&D) projects that enable scientists from NATO and its partner nations to collaborate on applied R&D and capacity building projects that result in new civil science advancements with practical application in the security and defence fields. MYPs enable participating countries to increase contacts in scientific communities while building a stronger scientific infrastructure in their home countries. Sustainability is ensured through the involvement of end-users offering advice and guidance throughout the lifetime of the projects with the aim of taking up and implementing the results.

DURATION
R&D Projects have an average duration of 24 to 36 months.

TARGET APPLICANTS
Applications are submitted jointly by an expert who is a national of, resident and employed in a NATO member country, and an expert who is a national of, resident and employed in a partner nation. Projects involving more than one NATO and one partner nation are encouraged, as is the participation of young scientists.

BUDGET
NATO funds are provided to cover project-specific costs linked to specific milestones such as scientific equipment, computers, software and training of project personnel and young scientists. Roughly half of the budget may be allocated to equipment; about 20% to training and travel; and 15% to stipends for young scientists. These percentages may vary according to the needs of each project. Project budgets usually range between EUR 150,000 – 350,000 over the entire duration of the project. As SPS is a partnership programme, institutions in partner nations should benefit from the majority of the budget.

For details regarding the management of MYP, please consult the **SPS Multi-Year Projects Handbook** available on the SPS website.

2

Advanced Training Courses (ATC)

WHAT
Tailor-made, modular courses designed to enable specialists in NATO countries to share their security-related expertise in one of the SPS Key Priority areas ATCs are not intended to be lecture-driven, but to be intensive, interactive, and practical in nature. These courses contribute to the training of experts in partner nations and enable the formation and strengthening of international expert networks.

DURATION
5-7 working days

TARGET AUDIENCE
20-50 trainees primarily from partner nations. These trainees are chosen on the basis of their qualifications and experience, and the benefit they may draw from the ATC for their future activities.

BUDGET
On average EUR 60,000. The SPS grant covers direct organizational costs, travel, and living expenses of all specialists, and attendance costs of trainees from countries eligible to receive NATO funding.

3

Advanced Research Workshops (ARW)

WHAT
ARWs are advanced-level discussions that provide a platform for experts and scientists from different countries to share their experience and knowledge on security-related topics. These events aim to identify directions for future actions to address contemporary security challenges, and often are the starting points for follow-on activities such as MYPs.

DURATION
2-5 working days.

TARGET AUDIENCE
20-50 participants.

BUDGET
Typically EUR 30,000-40,000. The SPS grant is intended to cover direct organizational expenses of the ARW, the travel and living expenses of key speakers, as well as the attendance of non-speakers from NATO member countries and partner nations unable to obtain support from other sources.

4

Advanced Study Institutes (ASI)

WHAT
ASIs are high-level tutorial courses conveying the latest developments in topics of relevance for NATO and the SPS Key Priorities to an advanced-level audience.

DURATION
7-10 working days.

TARGET AUDIENCE
60-80 pre- and post-doctoral level scientists with relevant backgrounds in the subject matter of the course. Young scientists from NATO partner nations are especially encouraged to attend.

BUDGET
On average EUR 60,000. The SPS grant pays for direct organizational costs, travel and living expenses for up to 15 lecturers, and for the attendance of students from countries eligible to receive NATO funding.

For details regarding the management of ARW, ATC, and ASI, please consult the **SPS Events Handbook** available on the SPS website.

SPS Key Priority Areas

All activities funded under the SPS Programme must address one or more of the SPS Key Priorities and have a clear link to security.

1 Facilitate mutually beneficial cooperation on issues of common interest, including international efforts to meet emerging security challenges

a Counter-Terrorism

- Methods for the protection of critical infrastructure, supplies and personnel;
- Human factors in the defence against terrorism;
- Detection technologies against the terrorist threat of explosive devices and other illicit activities;
- Risk management, best practices and technologies in response to terrorism.

b Energy Security

- Innovative energy solutions for the military; battlefield energy solutions; renewable energy solutions with military applications;
- Energy infrastructure security;
- Maritime aspects of energy security;
- Technological aspects of energy security.

c Cyber Defence

- Critical infrastructure protection, including sharing of best practices, capacity building and policies;
- Support in developing cyber defence capabilities, including new technologies, and support to the construction of information technology infrastructure;
- Cyber defence situation awareness.

d Defence Against CBRN Agents

- Methods and technology to protect against, diagnose effects of, detect, decontaminate, destruct, dispose and contain CBRN agents;
- Risk management and recovery strategies and technologies;
- Medical countermeasures against CBRN agents.

e Environmental Security

- Security issues arising from key environmental and resource constraints, including health risks, climate change, and water
- Scarcity, and increasing energy needs, which have the potential to significantly affect NATO's planning and operations;
- Disaster forecast and prevention of natural catastrophes;
- Defence-related environmental issues.

2 Enhance support for NATO-led operations and missions

- Provision of civilian support through SPS Key Priorities;
- Provision of access to information through internet connectivity as in the SILK-Afghanistan Programme;
- Cultural and social aspects in military operations and missions;
- Enhancing cooperation with other international actors.

3 Enhance awareness on security developments including through early warning, with a view to preventing crises

a Security-related Advanced Technology

- Emerging technologies including nanotechnology, optical technology, micro satellites, metallurgy and the development of Unmanned Aerial Vehicle (UAV) platforms.

b Border and Port Security

- Border and port security technology;
- Cross border communication systems and data fusion;
- Expert advice and assessments of border security needs and best practices.

c Mine and Unexploded Ordnance (UXO) Detection and Clearance

- Development and provision of advanced technologies, methodologies and best practices;
- Solutions to counter improvised explosive devices (IED).

d Human and Social Aspects of Security Related to NATO's Strategic Objectives

4 Any project clearly linked to a threat to security not otherwise defined in these priorities may also be considered for funding under the SPS Programme. Such proposals will be examined for links to NATO's strategic objectives

How to Apply

Who Can Apply

Applications for funding must be submitted jointly by an expert who is a national of, resident and employed in a NATO member country, and an expert who is a national of, resident and employed in a partner nation. Please find an overview of NATO and partner countries below:

NATO Countries

Albania, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Montenegro, Netherlands, the Republic of North Macedonia, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Turkey, United Kingdom, United States.

NATO Partners

Afghanistan, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Colombia, Egypt, Finland, Georgia, Iraq, Ireland, Israel, Japan, Jordan, Kazakhstan, the Republic of Korea, Kuwait, Kyrgyz Republic, Malta, Mauritania, the Republic of Moldova, Mongolia, Morocco, New Zealand, Pakistan, Qatar, Serbia, Sweden, Switzerland, Tajikistan, Tunisia, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan.

General eligibility criteria

SPS accepts applications in line with the SPS grant mechanisms, and in response to calls for proposals advertised on the SPS website. To be deemed eligible for funding, proposals submitted to the SPS Programme must:

- contribute towards NATO's Strategic Objectives and have a clear link to security;
- address at least one of the SPS Key Priorities;
- be led by a co-director who is a national of, resident and employed in a NATO member country, and a co-director who is a national of, resident and employed in a partner nation;
- be developed and implemented by co-directors affiliated with a government, academic, or other non-profit institutions. For-profit private companies are not eligible for SPS funding;
- include realistic plans and budgets;
- be developed and managed in alignment with rules and regulations outlined in the SPS handbooks, which are regularly updated and made available at the time of publication of new calls for proposals.

When and how to apply

The Programme may publish calls in two formats:

- Open Calls encourage applications addressing any of the SPS Key Priorities.
- Special Calls invite applications addressing specific priorities and themes of particular relevance at the time of publication.

Details on how to submit new applications are explained in each call for proposals. A decision on funding can take up to nine months following an application deadline. It is important to take this into consideration when proposing dates for an activity.

Please consult the NATO SPS website ***www.nato.int/science*** for the latest application deadlines.

For queries prior to the submission of an application, potential applicants may contact SPS at ***sps.info@hq.nato.int***

Applications for funding should be sent to: ***sps.applications@hq.nato.int***

Application and Approval Procedure

- At least one NATO Country Expert
- At least one Partner Country Expert must collaborate

- Select a topic (in line with the SPS Key Priorities)
- Select a grant mechanism (MYP, ARW, ATC, ASI)

- Submit your application to the SPS Programme in response to a call for proposals

- Peer review by the Independent Scientific Evaluation Group (ISEG)
- Approval by NATO Allies in the Partnerships and Cooperative Security Committee (PCSC)

- After receiving the Award Letter from NATO SPS staff, start your collaboration!

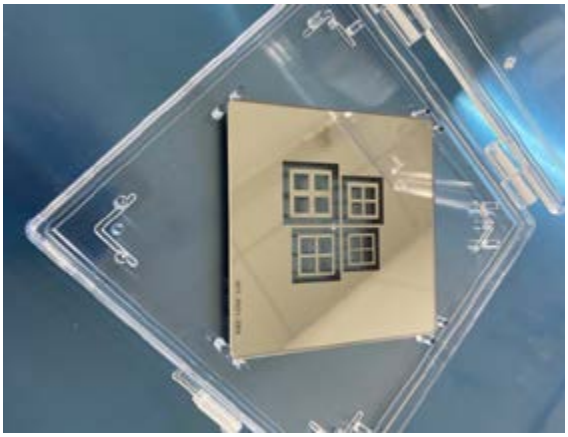
Highlights of SPS activities led by Croatia

Counter-Terrorism

ONGOING

MYP 'Enhancing Security at Borders and Ports (E-SiCure2)'

Participating countries: *Croatia (Rudjer Boskovic Institute), Japan (National Institutes for Quantum and Radiological Science and Technology) in cooperation with Slovenia (Jozef Stefan Institute) and Portugal (University of Aveiro)*



ESiCure2 is a follow-on to a previously completed project (ESiCure), which has designed and fabricated a state-of-the-art radiation detector. ESiCure2 aims to develop a semiconductor-based sensing device capable of delivering a space-resolved signal of a source emitting both neutrons and X-rays, enabling the identification of explosive CBRN materials or special nuclear materials. This system will provide a solution to address the major challenge of illicit materials trafficking at maritime ports or terrestrial borders. The novel sensing device will be scalable, affordable, robust and versatile enough to detect dissimulated threats at ports of entry, along unattended borders, for in-transit monitoring of cargo and crowds, for mounted mobile surveillance tools, as well as for personal and distributed detector networks. Such technology would largely outperform existing screening capabilities, namely through synchronous neutron and X-rays detection, decreasing inspection times and false-positives. Croatian scientists from the Rudjer Boskovic Institute are responsible for material characterization, detector characterization and radiation response tests.

https://www.nato.int/nato_static_fl2014/assets/pdf/2021/3/pdf/210301-sps-flyer-esicure.pdf

http://e-sicure.web.ua.pt

https://twitter.com/e_sicure

COMPLETED

MYP 'Engineering Silicon Carbide for Enhanced Border and Port Security (E-SiCure)'

Participating countries: *Croatia (Rudjer Boskovic Institute (RBI)), Australia (Australian nuclear science and technology organization) in cooperation with Japan National Institutes for Quantum and Radiological Science and Technology (QST)), Slovenia (Jozef Stefan Institute (JSI)) and Portugal (University of Aveiro (UA))*

Developing swift and effective methods to detect the illicit trafficking of nuclear materials has become an issue of increasing importance for national and regional security. The completed E-SiCure project developed and tested a prototype of a state-of-the-art silicon carbide (SiC)-based radiation detector. Due to the global shortage of helium-3 isotopes, SiC was singled out as the most promising semiconductor material for the new-generation detector. It gives the detector enhanced capabilities in responding to thermal and fast neutrons. This Multi-Year Project was completed in 2019, and a follow up project building on its achievements - ESicure2 - was approved in 2020.

Crisis Management

MYP 'Advanced Regional Civil Emergency Coordination Pilot (ARCECP)'

COMPLETED

Participating countries: *USA (MIT Lincoln Laboratory), Croatia (National Protection and Rescue Directorate), Bosnia and Herzegovina (Ministry of Security), Montenegro (Ministry of Interior – Directorate for emergency management), and North Macedonia (Crisis Management Center)*

This flagship Multi-Year Project, closed in 2021 and supported by the SPS Programme and the US Department of Homeland Security, Science & Technology Department, has developed and implemented a Next-Generation Incident Command System (NICS) to facilitate the coordination among responders and improve civil emergency management across the Western Balkans. The new technology allows responders from Bosnia and Herzegovina, Montenegro, Croatia and North Macedonia to share all kinds of information about an incident, including GPS locations or images, via mobile devices. This is maximising real-time situational awareness and helps to find a coordinated, appropriate response to natural or man-made disasters.

The NICS system was successfully tested during the NATO field exercises 'Bosnia 2017', 'Serbia 2018', 'Montenegro 2019', and 'North Macedonia 2021'.

Croatia implemented NICS locally with users from the Ministry of Interior, Croatian Mountain Rescue Service (CRO) and the Varaždin County and fire brigade. A project info sheet and video are available on SPS website.

https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_11/20161128_161128-sps-arcepc.pdf

https://www.youtube.com/watch?v=7Ox1Bl9ME-w

Energy Security

NEW

MYP 'High Energy Calcium-Oxygen Batteries'

Participating countries: *Croatia (Faculty of Chemical Engineering and Technology, University of Zagreb), Serbia (Institute of Chemistry, Technology and Metallurgy, University of Belgrade) in cooperation with Sweden (Department of Physics, Chalmers University of Technology).*

Batteries are indispensable in the process of decarbonisation of the energy sector and the implementation of renewable energy sources. This recently approved project will deal with the development of new and advanced energy storage and conversion. Research will focus on gaining and providing sufficient knowledge for developing a low cost, high energy, long life cycle battery system based on a calcium anode and oxygen (air) cathode.

Cyber Defence

COMPLETED

ATC 'Toward Effective Cyber Defense in Accordance with the Rule of Law'

Participating countries: *Croatia (Faculty of Law, University of Osijek) and the Republic of North Macedonia) (Faculty of Law, Goce Delcev University in Stip) in cooperation with Bosnia and Herzegovina (Faculty of Humanistic Sciences, University Dzemal Bijedic, Mostar)*

The goal of this Advanced Training Course (ATC) was to discuss legal aspects governing cyber defence during peacetime and the international law of armed conflict applicable to cyber defence. Through an interactive approach, trainees were able to understand why and how exploiting cyberspace for geopolitical advancement represents a serious security challenge. Applying critical thinking methods, trainees learned about the legal aspects of organizing effective cyber defence in accordance with the rule of law during peacetime. The event took place in November 2019 in Ohrid, North Macedonia and gathered 38 participants from eight countries as well as 18 speakers from 11 countries.

CBRN Defence

COMPLETED

ARW 'Defence against Bioterrorism: Methods for Prevention and Control'

Participating countries: *Croatia (Faculty of Food Technology Osijek, University of Osijek) and Serbia (Military Medical Academy, University of Defence)*

This top-down SPS Advanced Research Workshop held in Belgrade on 16 - 17 March 2017 focused on three major aspects: primordial, primary and secondary level of prevention of a bioterrorist attack. The main aspect stressed throughout the ARW was that a chance of a bioterrorist attack is "not if, but when and how extensive it will be".

The event represented the continuation of the previous ARW 'Exploring Synergies between Bioterrorism Preparedness and General Public Health Measures' that took place in Belgrade in November 2010, which developed a new methodology for biological outbreak investigation. The aim of this second ARW on bioterrorism was the development of a complete biodefence system through additional methodologies for the prevention and control of biological threats. These were developed while analysing unusual epidemiological events since 2011. The event discussions were summarized in an article published in the NATO Science Series.

Advanced Technology

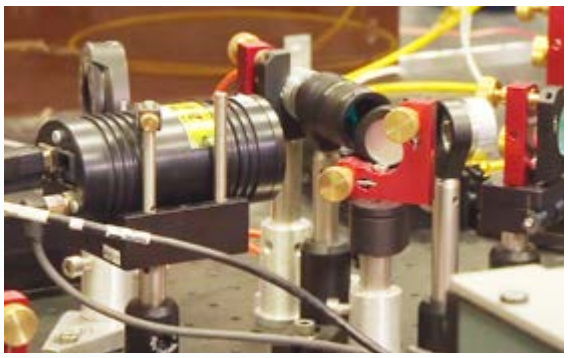
ONGOING

MYP Biological and Bioinspired Structures for MultiSpectral Surveillance

Participating countries: *Croatia (Institute of Physics) and Serbia (Institute of Physics)*

This project aims to develop a proof-of-concept for a multispectral surveillance camera, which will cover ultraviolet (UV), visible and infrared (IR) radiation, and include an innovative sensor with internal nanostructures similar to butterfly wing scales. This multispectral approach will improve the detection, recognition, and identification of surveillance systems in a broad range of applications such as unexploded mine detection or illicit trafficking control.

http://holobio.ifs.hr/



COMPLETED

MYP 'MORUS - Unmanned System for Maritime Security and Environmental Monitoring'

Participating countries: *Croatia (University of Zagreb FER (LARICS)), Ireland (University of Limerick (UL)), in cooperation with Bosnia and Herzegovina (University of Sarajevo)*

Today, mapping and monitoring of coastal, off-shore and underwater areas is an important task of civil and military authorities when securing borders, preventing illicit trafficking and illegal migration, and preparing naval trainings and operations. With maritime traffic on the rise, there is a need for better mapping and monitoring which current systems cannot meet. This Multi-Year Project led to the design and production of 'MORUS' - a fully operational, robotic system comprised on an Unmanned Aerial Vehicle (UAV) and an Unmanned Underwater Vehicle (UUV). MORUS is the world's first robotic system of its kind, filling the gap of currently available tools with its ability to use sensor equipment weighing up to 100 kilograms. Paired with cameras, the prototype is able to act autonomously, collecting images and relaying data in currently unmapped or inaccessible environments.

https://www.fer.unizg.hr/morus

General assembly and project demonstration, 7th October 2016, Biograd na Moru, Croatia

Mine and Unexploded Ordnance Clearance and Detection

COMPLETED

MYP 'Biological Method (Bees) for Explosive Detection'

Croatia (Croatian Mine Action Centre - Centre for Testing, Development and Training (HCR-CTRO)) and Bosnia and Herzegovina (University of Banja Luka) in cooperation with United Kingdom (University of St Andrews) and Croatia (University of Zagreb)

This Multi-Year Project developed a novel method to detect landmines using an innovative approach: employing honeybees. Honeybees are known for their ability to "sniff" a variety of compounds from drugs to pesticides to CBRN materials, and recent studies have proven that they can also detect explosives. By combining the search and collection of explosives by honeybees with imaging and sensing technologies, the results of the detection process are much more efficient. This new method is expected to reduce the time and the cost of detection and help mine action centres release land for civilian use. It has resulted in the development of novel explosive detection tools for humanitarian demining using honeybees in combination with explosive vapour sensors and advanced imaging techniques.

Human and Social Aspects of Security

COMPLETED

ARW 'Zagreb Security Forums'

Participating countries: *Croatia (Hybrid Warfare Research Institute) and Israel (Bar-Ilan University)*

The Zagreb Security Forum is a yearly event that takes place in Zagreb, Croatia since 2016. The Zagreb Security Forums are aimed at sharing best practices, case study analyses, policy options debates, and creating a regional network of experts and officials in East, and South Eastern Europe. Addressing topics such as critical infrastructure protection, resilience, and hybrid challenges, these Forums bring together leading scientific experts with proven track records from different but interconnected disciplines and fields of expertise. Together with policymakers and security officials, they discuss how best to deal with emerging threats in national, regional and European contexts. The NATO SPS Programme has supported three (2017, 2019, 2020) out of six editions of this event.

https://zagrebsecurityforum.com/

Notes

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Science for Peace and Security (SPS) Programme

Emerging Security Challenges Division (ESCD)

www.nato.int/science

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