NATO Science for Peace and Security Programme

ANNUAL REPORT

2024

The SPS Programme provides funding and expert advice for civil security-related activities in the form of Multi-Year Projects (MYPs), Advanced Research Workshops (ARWs), Advanced Training Courses (ATCs), and Advanced Study Institutes (ASIs).

Each SPS-supported activity must involve at least one researcher from a NATO Ally and one researcher from an eligible NATO partner nation, and address at least one of the SPS Key Priorities.

Foreword by
Jean-Charles Ellermann-Kingombe

2024 has been a challenging year to our security, with the continuing Russian war of aggression in Ukraine, the intensification of geopolitical tensions and the proliferation of hybrid threats. However, these challenging times encouraged NATO and the Innovation, Hybrid and Cyber Division to even further strengthen innovation in our pursuit for security in the Euro-Atlantic area.

The Science for Peace and Security Programme has proven to be a valuable NATO tool in that regard, improving security through science and through building bridges. In 2024, the Allies agreed on a revised list of thematic priorities for the SPS Programme, to maintain its focus on current and emerging security challenges that define NATO's strategic environment. New or reinforced focus on priorities such as EDTs, hybrid and environmental threats, resilience, critical undersea infrastructure protection, countering disinformation etc. encouraged the scientific community to join us in the shared goal of providing security to more than a billion people.

As a clear sign of relevance, the first two calls with the new SPS priorities have attracted the highest number of proposals in the Programme's six decades of history. Throughout 2024, the SPS has supported more than 100 ongoing activities and has received more than 300 new proposals. The difficult times have stimulated the brightest of minds to step forward with brave and innovative solutions to rapidly emerging security threats.

In the new era, thoughts are still not transmitted by radio, as the Nobel Prize winner and inventor of radio Guglielmo Marconi imagined 150 years ago. However, in 2024 the SPS programme supported hundreds of scientists' innovative ideas and activities related to quantum communications, AI, autonomy and space.

In parallel to scientific excellence, the SPS Programme supported many activities directly aiming to improve the security of people. Supporting the research on the use of drones in crisis management situations, safer mine detection, CBRN protection with new technologies, resilience building and environmental hazards detection, for example, paves the way to the rapid adoption of technologies with direct benefit for society.

Not only have we witnessed a remarkably fast-paced scientific and techno-logical advancement but also a confirmation of the importance of doing it together. SPS has continued fostering sustainable partnerships between NATO Allies, NATO partners, and societies directly based on the shared values and common striving for knowledge and scientific development. In 2024, the SPS continues its active engagement with the Ukrainian sci-entific and academic community, with Ukraine being the nation with the highest interest and participation in the Programme. The focus on the cooperation with the South through additional analysis, exploration of venues for scientific cooperation and direct engagement is also bearing fruits. NATO partners confronted with a volatile security context have actively used the SPS-provided opportunities to improve their resilience. Cooperation with the Indo-Pacific NATO partners has contributed to the valuable knowledge exchange to tackle emerging security challenges. The active engagement with partners across the globe has reaffirmed the unique partnership value of the SPS.

In addition to fostering scientific excellence and cooperation, in 2024 the SPS has managed to achieve something even more – building trust – in science, in partnership and in NATO's efforts to innovate and maintain its technological edge.

Jean-Charles Ellermann-Kingombe
Assistant Secretary General
for Innovation, Hybrid and Cyber

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SPS 2024 in Numbers

6 SPS
Information
days

Sofia
Bulgaria

Skopje
North Macedonia

Bucharest
Romania

Seoul
Republic of Korea

Baku
Azerbaijan

Kuwait City
Kuwait

63 Proposals
Approved
in 2024

2 Call
Deadlines
in 2024

• 2024/1: 21 January
• 2024/2: 30 June

Outcomes

Call for proposals	Proposals received	Approved
2024/1	141	33
2024/2	161	30

**23** **Multi-Year Projects Completed Addressing the following key priorities**

• 1 Counter Terrorism
• 1 Energy Security
• 6 Chemical, Biological, Radiological, Nuclear
• 2 Environmental Security
• 13 Advanced Technology

15 **SPS-supported Events**

• 12 Advanced Research Workshops
• 3 Advanced Training Courses

Completed MYPs following SPS Key Priorities

☐ Counter terrorism
☐ Energy security
☐ CBRN defence
☐ Environmental security
☐ Advanced technologies
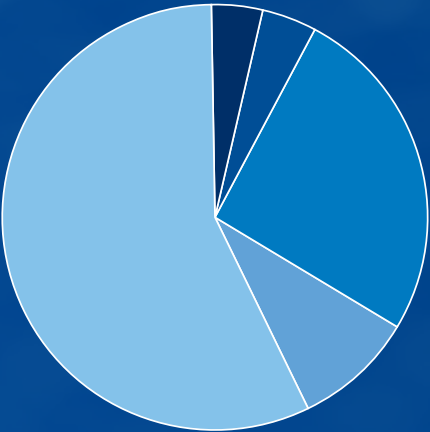
2024 Revised
SPS Key Priorities

Each activity supported by the SPS Programme must address at least one of the SPS Key Priorities.

In April 2024, NATO Allies agreed to an updated list of SPS thematic priorities, which enables the SPS Programme to both continue its involvement in existing thematic areas and extend its activities in fields of strategic relevance previously less explored.

The Revised SPS Key Priorities reflect the objectives set in the NATO 2030 Agenda, and in the 2022 NATO Strategic Concept, agreed by Allies at the Madrid Summit.

Why does this matter to NATO?

A lot has changed for SPS, NATO, NATO partners and the world since 2012. The Alliance has welcomed four new members to the Alliance and new challenges and opportunities have arisen. New emerging disruptive technologies, including artificial intelligence (AI) and data, environmental security challenges, and the geopolitical dynamics have changed the security environment. Our security landscape has vastly evolved, and the Alliance has to adapt to these new challenges. In 2021, Allies agreed on NATO 2030 Agenda, a forward-looking agenda aimed at strengthening the Alliance for the challenges of today and tomorrow. Improving resilience, preserving our technological edge, addressing hybrid threats, protecting critical undersea infrastructure, advancing environmental security and strengthening partnerships are some of the points from the agenda that are essential to SPS's mission.

The new NATO Strategic Concept was adopted in 2022, acknowledging the significant changes in the security environment. The new SPS Key Priorities are adapted to the new challenges and opportunities the Alliance faces and allow for the Allies and NATO partners to cooperate on important scientific topics while improving partnerships towards peace and security.

SPS Key Priorities

Innovation and Emerging Disruptive Technologies (EDTs)
- Emerging technologies with the potential of having a profound impact on security, including:

  - artificial intelligence (AI);
  - autonomy;
  - quantum;
  - biotechnologies and human enhancement;
  - space;
  - novel materials and manufacturing;
  - energy and propulsion;
  - next-generation communications networks;

- Defence against adversarial use of EDTs;
- Advanced and novel technologies in the field of security.

Energy Security
- Dual-use innovative energy solutions; battlefield energy solutions; renewable energy solutions with dual-use applications;
- Energy infrastructure security, including technological aspects of energy security;
- Energy transition by design, i.e. transition from fossil fuels to innovative and more sustainable energy sources;
- Energy supply chain.

Environmental Security
- Understanding, mitigating and adapting to the impact of climate change on security, including military operations and missions;
- Increased awareness on security issues arising from key environmental and climate change challenges, including health risks, scarcity of resources, increasing energy needs, and space weather events;
- Approaches to reduce the environmental impact of military activities;
- Disaster forecast and prevention of climate-related natural catastrophes.

Counter terrorism (CT)
- Detection technologies against the terrorist threat of explosive devices and other illicit activities;
- Solutions to Counter Improvised Explosive Devices (C-IEDs);
- Defence against terrorism misuse of technology, for example Countering Unmanned Aircraft Systems (C-UAS);
- Human factors in the defence against terrorism, including Preventing/Countering Violent Extremism (P/CVE);
- Risk management, best practices and technologies in response to terrorism, including Chemical, Biological, Radiological and Nuclear Defence.

Chemical, Biological, Radiological, and Nuclear (CBRN) and Explosive Hazards Management

- Mine and Unexploded Ordnance (UXO) detection;
- Methods and technology regarding the protection against, diagnosing effects, detection, decontamination, destruction, disposal and containment of CBRN Agents;
- Risk management and recovery strategies and technologies;
- Medical countermeasures against CBRN Agents.

Defence against Hybrid Threats

- Technological solutions and approaches to prepare, deter and defend against the coercive use of political, energy, information and other hybrid tactics by states and non-state actors;
- Solutions and approaches to prepare, deter and defend against hybrid tactics, both directly and through proxies, as authoritarian actors challenge our interests, values and democratic way of life;
- Practical tools to monitor, analyse, raise awareness on, and counter disinformation, including through cooperation with technological industries and social media platforms, such as generative AI and deep fakes;
- AI tools, including reverse image technology, to detect malicious information activities;
- Early warning tools to detect potential hybrid activities, including in the information space.

Resilience

- Solutions to strengthen national preparedness;
- Crisis management and civil preparedness, including inter-agency coordination mechanisms;
- Digital resilience, including methods, procedures and technologies to ensure continuity of digital services during crises;
- Protection of critical infrastructure, supplies and personnel;
- Border and port security technologies.

Critical Underwater Infrastructure (CUI)

- Monitoring and protection of critical underwater infrastructure;
- Technology for the detection of threats on surface and underwater;
- Protection of harbours and infrastructures in shallow waters.

Cyber Defence

- Technologies to ensure confidentiality, integrity and availability of communication networks;
- Support in developing cyber defence technologies and infrastructure;
- Best practices and information sharing;
- Cyber defence situational awareness;
- Cyber support to operations and missions.

Assessing and Addressing Threats Posed by the Russian Federation

- Approaches and tools to counter hostile information activities (including disinformation) against Allies and Partners;
- Identification of trends and lessons learned for hybrid threats emanating from the Russian Federation.

Strategic Foresight

- Main trends in international security and associated implications;
- Regional strategies in the field of defence and security;
- Understanding of the future security environment;
- Early warning systems and indicators.

Operational Support

- Identifying and sharing best practices in operations and missions;
- Civilian support to operations and missions.

Human and Social Aspects of Security

- Women, Peace and Security (WPS);
- Human Security;
- Cultural and social aspects in operations and missions.

SPS Milestones
in 2024

# SPS Milestones in 2024

January

First call for proposals – deadline 21 January

Both the first and second call for proposals in 2024 had the largest amounts of proposals submitted in SPS history. 143 proposals were submitted to the first call.

February

SPS celebrated award-winning scientists

SPS presented two award-winning scientists in bioengineering and biophotonics, who shared their outstanding research and development of technologies, inspired by nature and supported by the SPS Programme.
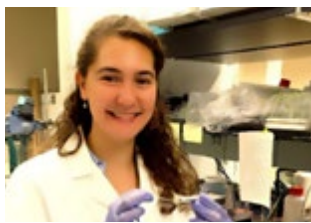
Dr Gozde Durmus from Stanford University is leading a new SPS research project aimed at developing a smart device that combines advanced nanotechnology and AI to detect harmful microorganisms in water and air.

Dr. Danica Pavlović, from the Institute of Physics in Belgrade, has completed a research project on the development of a low-cost, multispectral surveillance camera using butterfly wing scales as camera pixels.

March

SPS in Quantum – Basel, 18 March

Dr. Claudio Palestini introduced the opportunities the SPS Programme offers for both scientific excellence and partnerships, highlighting NATO's approach to quantum technologies and EDTs.

19-20 March - ISEG Meeting

The Independent Scientific Evaluation (ISEG) Group met in Brussels for the evaluation and review of the proposals that were received in January 2024. 39 proposals were recommended for funding.

SPS Information Day in North Macedonia – 28 March

As part of celebrations for the fourth anniversary of North Macedonia's accession to NATO, SPS held an Information Day in Skopje in cooperation with North Macedonia's Ministry of Defence. NATO experts and researchers from across North Macedonia convened in Skopje on 28 March 2024 to explore opportunities for scientific cooperation within the SPS framework. The Information Day, which was organised in cooperation with North Macedonia's Ministry of Defence, aimed to facilitate the launch of new research and development activities by highlighting awareness of the opportunities provided by SPS.

April

NATO Allies agreed to new Key Priorities for SPS

Allies agreed on a revised list of thematic priorities for the SPS Programme, aimed at strengthening SPS's alignment with NATO's.

SPS promoted environmental security in the Gulf Region Conference 2024

On 23-24 April 2024, SPS took part in the second NATO-Istanbul Co-operation Initiative Regional Centre Conference on environmental security in Kuwait. SPS ran an information session to encourage researchers and scientists from the NATO-Istanbul Cooperation Initiative (ICI) participating countries to engage alongside NATO Allies in innovative research activities.

May

SPS is enhancing cooperation with the South

The SPS team developed a stocktaking report on the cooperation with the Mediterranean Dialogue and Istanbul Cooperation Initiative partners, contributing to the discussions on NATO's enhanced cooperation with the South. This effort paved the way towards practical recommendations for enhancing SPS cooperation with this region and supported the work of the NATO Special Representative for the Southern Neighbourhood.

June

Second call all for proposals – deadline 30 June

161 proposals were submitted to the second call for proposals of 2024.

July

SPS launched a project on exploring ways to reroute internet to space in case of disruption to critical infrastructure

The SPS initiative *'HEIST-Hybrid space/submarine architecture Ensuring InfoSec of Telecommunications'* aims to make the internet less vulnerable to disruption by rerouting the flow of information into space in the event that undersea cables are attacked or accidentally severed. The project is expected to produce a working prototype by 2026, through the collaborative efforts of US, Iceland, Sweden and Switzerland.

August

SPS launched Autonomous Drone Competition (SAPIENCE: Sense & Avoid) in London

On 29 and 30 August, four teams from universities in the Netherlands, United Kingdom, United States, and Austria took part in the SPS-supported SAPIENCE drone competition in London. The SAPIENCE project shows how autonomous drones that cooperate with each other may be used in crisis management scenarios. The lessons learned will feed into the two other competitions planned as part of the project, which will take place in 2025 in the United States and in 2026 in the Netherlands.
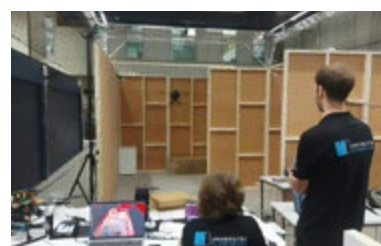
September

SPS organized Information Day in the Republic of Korea

On 4 September, Dr. Eyup Turmus from the SPS team visited Seoul for an SPS Information Day, during which scientists and subject-matter experts from the Republic of Korea were briefed on current and future work under the SPS Programme, and discussed ideas for future project proposals.

SPS supported scientists to explore weather impact on satellite launches at Andøya Space Center

Scientists at the Andøya Space Center in Northern Norway have been examining the challenges for satellite launches, re-entry procedures, and new hypersonic systems posed by unidentified weather patterns at high altitudes. The Multi-Year Project project, 'Dynamics above Epicentre of Climate Change (DECC)', supported by SPS, is led by research institutes in Germany, Norway, Sweden and Finland. The successful insights gained from these studies will help shape future strategies for satellite operations, space vehicle launches, and the development of resilient infrastructure in response to the evolving challenges posed by climate change.

SPS organized an Information Day in Azerbaijan

In September, a team from SPS travelled to Baku, Azerbaijan, to strengthen practical scientific cooperation and to kick off a new research project focused on protecting critical infrastructure from cyber-attacks. The SPS team took the opportunity to organize an Information Day at ADA University. Over 40 participants from academia, as well as from Azerbaijan's Ministry of Foreign Affairs and Ministry of Defence participated in the event.

October

2-3 October 2024 – The Independent Scientific Evaluation Group (ISEG) meeting and evaluation of proposals

The ISEG meeting took place in Brussels for the evaluation and recommendation of the applications received in the second call for proposals. Out of the 161 original proposals 35 proposals were recommended.

9 October – Working Group on Scientific and Environmental Cooperation with Ukraine

Assistant Secretary General Ellermann-Kingombe and the SPS team welcomed representatives from the Ministry of Education and Science of Ukraine to discuss scientific cooperation and plans for scientific and academic reconstruction. The meeting served to discuss on-going SPS activities and to encourage new ideas for cooperation.

SPS fostered security-related scientific cooperation with Romania at an Information Day in Bucharest

On 16 October 2024, members of SPS were in Bucharest for an Information Day, as an opportunity to mark Romania's twentieth anniversary in NATO and to highlight Romania's scientific contribution to the Alliance. Dignitaries and researchers gathered to mark past and current successes of cooperation through SPS.

SPS Information Day in Sofia highlights 30 years of scientific cooperation with Bulgaria

In October, a team from SPS went to Sofia to further strengthen scientific cooperation with Bulgaria. Representatives from the SPS Programme and Bulgarian government officials highlighted the value of three decades of cooperation. Scientists at the event were joined by members of the diplomatic community, as well as officials from Bulgaria's Ministry of Defence, Ministry of Foreign Affairs, and Ministry of Education and Science.

November

SPS boosted scientific cooperation on environmental security in the southern neighbourhood

Experts from 16 Allied and NATO partner countries, the European Union and the African Union gathered in Rome (Italy), from 19 to 21 November 2024, to examine some of the most pressing environmental challenges facing Europe and the Mediterranean region. SPS discussed the outcomes of one of the related initiatives conducted under its umbrella, the 'Managing natural hazards in the Euro-Mediterranean region: security impacts and crisis management' advanced research workshop. In the face of extreme weather events, rising sea levels and drought, the security implications across the Alliance's southern neighbourhood are significant.

SPS Luminaries: Guglielmo Marconi event at NATO HQ

SPS held the first edition of the SPS Luminaries series celebrating the Nobel Prize winner Guglielmo Marconi's exceptional scientific legacy. Marconi is credited as the inventor of the radio and for the scientific breakthrough of wireless transatlantic transmissions. Several SPS-funded projects presented their research, paying homage to Marconi's legacy and contributing to scientific innovation for peace and security. These research projects have brought together scientists from Finland, Iceland, Jordan, Portugal, Qatar, Slovakia, Spain, Sweden, Switzerland, and the U.S.

December

SPS marked the closure of INFORM project

This SPS project aimed to set up a platform to bring together key stakeholders from Europe, North America, Japan, Australia, the Republic of Korea and New Zealand for a common strategic reflection onthe future challenges in the Indo-Pacific region and on how they may impinge on Euro-Atlantic security. Specifically, it looked at improving understanding of how geostrategic and military dynamics in the Euro-Atlantic and the Indo-Pacific regions are increasingly interconnected.

SPS on the Map

Ukraine

Ukraine has been actively engaged in SPS coordinated activities since 1991. Following Russia's illegal annexation of Crimea in 2014, cooperation has been strengthened and Ukraine has since become the largest beneficiary of the SPS Programme.

Leading areas of cooperation with Ukraine in the SPS framework include EDTs, energy security, CBRN, energy and environmental security, and counterterrorism. As of the end of 2024, Ukraine was the most active NATO partner country within the SPS framework, being engaged in 33% of the ongoing activities. In the referenced year, 98 activities were completed, 44 were ongoing and 10 were awaiting launch.

G6032 • MYP 'UAV Mosquito Fleet for Smart Swarm Operations (UAVM4SSO)'

Participating countries: Estonia, Ukraine

This ongoing multi-year project is conducted in partnership between the Tallin University of Technology in Estonia and the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". The project aims to develop an innovative edge computing concept for Unmanned Aircraft Vehicles (UAVs), called UAV Mosquito Multi-scale Fleet (UAVMF), for drone swarming operation. The system will be composed of UAVs of different sizes and aims to be used for the monitoring, rescue, surveillance, reconnaissance, anti-terrorism, military, and police activities. This project supports NATO's strategic objective to ensure the full range of capabilities necessary to deter and defend against any security threat.

G6249 • MYP 'R-GRID – AI Algorithms for Threat Prediction and Power Grid Protection'

Participating countries: Poland, Ukraine

The 25-month initiative tackles the need to enhance the resilience of electric power networks, in Ukraine and in Allied countries, using recent advancement in IT technologies, particularly in AI and optimization algorithms. Led by the Polish Association for National Security and the Ukrainian Institute for the Future, this project seeks to support Ukraine in enhancing the resilience of its power grids. The threat prediction simulator's goal is to allow for targeted investments in detection systems that limit or delay hostile actions.

G6261 • MYP 'UXO Identification and Classification for Ukraine (MinesEye)'

Participating countries: Poland, Ukraine

Developed by the Polish POSTUP Foundation in co-operation with the National Academy of Sciences of Ukraine, the project seeks to accelerate the demining process via the use of Unmanned Aircraft Vehicles (UAV) for the identification and classification of explosive ordnance.

Implementation of the MinesEye project could help to increase security in Ukraine and mitigate the consequences of the war through demining exercise.

G6271 • MYP 'GOLUB – Small UAV Operation in Atmospheric Icing Conditions'

Participating countries: Italy, Ukraine

UAVs are a disruptive technology reshaping civil and military capabilities and operations. To perform their tasks, UAVs need to be able to operate in remote areas and in all weather conditions. Operation in extreme environments exposes UAVs to atmospheric icing, which is particularly severe for small UAVs due to low altitude of operation, their light weight and the peculiarity of icing physics. Politecnico di Milano in cooperation with Oles Honchar Dnipro National University aim to address these challenges by assessing the performance degradation caused by atmospheric icing on UAVs aerodynamics and on their propulsion system.

The results will be leveraged in the development of an icing severity index, which could be applied to mission planning in icing environments.

Mediterranean Dialogue

The Mediterranean Dialogue is a NATO partnership forum that aims to contribute to security and stability in the wider Mediterranean region, and promote good relations and understanding among participating countries and NATO Allies.

The following non-NATO countries take part in the Dialogue: Algeria, Egypt, Israel, Jordan, Mauritania, Morocco and Tunisia. SPS currently has 23 projects with NATO partners from the Mediterranean Dialogue framework.

G5973 • MYP 'Implementation of a Terahertz System Dedicated to the Identification of Illicit Substances'

Participating countries: France, Algeria, Sweden

Terahertz (THz) technology is becoming important in the detection and identification of hidden objects and substances. Thanks to a previous SPS project (G5396), the Ecole Militaire Polytechnique (EMP) in Algeria has been equipped with a THz laboratory capable of inspecting persons and luggage, working at around 100 GHz. The project brings together expertise from different domains (telecommunications, optics, material science, etc.) in order to advance the state-of-the-art of terahertz technology and to increase its Technology Readiness Level, with potential near-future applications in the field of border security and counter terrorism.

G6189 • MYP 'Enhancing Tunisian C-IED Capabilities'

Participating countries: United Kingdom, Tunisia

Since 2013, Tunisia has experienced threats from terrorist use of (IEDs), as well as from World War II explosive remnants of war (ERW). Tunisia established the Centre of Excellence for EOD Tunisia (CEET) in 2015, re-branded to the Tunisian C-IED Centre of Excellence (TC2E) in 2020, with the intent of training EOD operators, C-IED operators and search teams to afford technical support for Army troops in counter-terrorism and in Humanitarian Mine Action (HMA). This MYP's objective is to establish an effective and comprehensive C-IED capability, combining specialised personnel and equipment, and standardised procedures into an organisation that can meet various mission requirements.

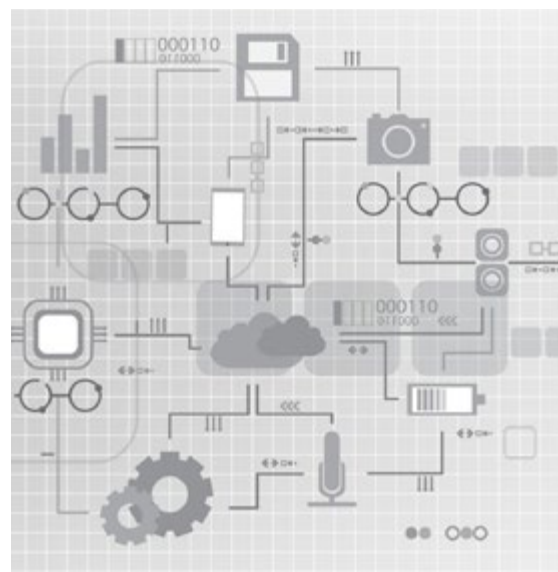# Istanbul Cooperation Initiative

The Istanbul Cooperation Initiative (ICI) is a NATO partnership forum that aims to contribute to long-term global and regional security by offering non-NATO countries in the broader Middle East region, the opportunity to cooperate with NATO.

The participating countries include Bahrain, Kuwait, Qatar and the United Arab Emirates. SPS currently has 19 projects (ongoing, approved, closed) with partners from the ICI.

G5797 • MYP 'Developing Physical-Layer Security Schemes for Internet of Things Networks'

Participating countries: Portugal, Qatar, Jordan

Internet of things (IoT) is the global concept of interrelated computing devices, digital machines and sensors capable to communicate and transfer data over a network. IoT is making the world smarter and more responsive, especially in the military and security domain. However, distributed nodes in IoT networks could constitute vulnerable entry points potentially compromising overall security. These nodes are also typically constrained by limited energy and processing capabilities. This MYP aims at developing lightweight security mechanisms tailored for IoT networks based on physical-layer security approaches. By proposing new Physical-Layer Security (PLS) schemes, the project aims to exploit the wireless channel intrinsic characteristics (i.e., estimated signal-to-noise ratio, random pa-
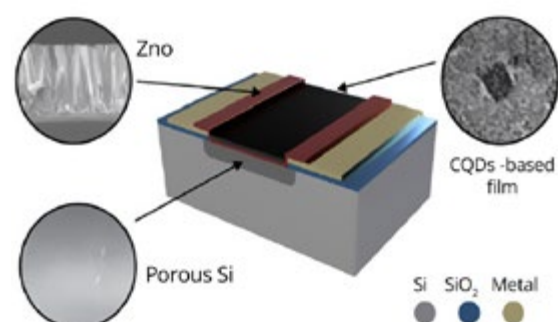

rameters, etc.) to achieve information security among legitimate ends in an IoT network.

G7264 • MYP 'Energy Efficient Next Generation Optoelectronics for Visible Light Communication'

Participating countries: United States, Kuwait, Greece, Republic of Korea, Serbia

This MYP is developing short wavelength high switching speed LEDs, new spectrally selective photodetectors, which are expected to provide resistance to interference in three practical environments (indoor, outdoor, and space). By addressing the technical challenges associated with visible light communication in free space, such as low switching speeds of LEDs and lack of spectrally selective photodetectors, the project aims to contribute to the advancement of communication technology. This includes enabling high-

speed data transmission rates, enhancing privacy, and reducing energy consumption.

Partnership for Peace (PfP)

The Partnership for Peace (PfP) Programme is a framework of practical bilateral cooperation between NATO and individual partner countries in the Euro-Atlantic area.

This partnership allows participating countries to build their own individual relationship with NATO, choosing their own priorities for cooperation. It includes 16 partner countries: Armenia, Austria, Azerbaijan, Bosnia and Herzegovina, Georgia, Ireland, Kazakhstan, Kyrgyz Republic, Malta, Republic of Moldova, Serbia, Switzerland, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

G6246 • MYP 'Ai4CUAV – Innovative AI Framework to Enable the Detection, Classification and Tracking of Killer Drones'

Participating countries: Italy, Bosnia and Herzegovina, North Macedonia, Republic of Moldova, Ukraine

Ai4CUAV intends to improve the detection, classification and tracking component of counter-drone systems through AI algorithms. Considering that any nominal counter-drone system is composed by multiple heterogeneous sensors, such as radar and electro-optical or infra-red sensors, the proposed algorithms would work on radar signatures and EO/IR images to enable the detection and classification of the drones, their trajectories and other information streams that improve situational awareness.

G6310 • MYP 'Enhancing CBRN Defence Capacity of Republic of Moldova (ResMD CBRN)'

Participating countries: Romania, Republic of Moldova

The aim of this multi-year project is to enhance the ability of the authorities in the Republic of Moldova to manage and respond to CBRN incidents caused by man-made disasters or terrorist activities. This objective falls under the broader goal of enhancing Moldova's national crisis and emergency response coordination and to support civil authorities in times of crisis, such as pandemics, chemical industrial accidents and other relevant CBRN related situations. The main outcomes of the project are focused on improving the CBRN response capabilities of General Inspectorate for Emergency Situations under the Ministry of Internal Affairs by equipping and training a CBRN Rapid Response Team and developing a set of procedures to support the management of CBRN related emergencies.

G6312 • MYP 'CACHE: Command and Control for Health and Environmental Security'

Participating countries: United States, Georgia, Albania

The increasing threat of chemical and biological attacks over the past decade demand greater defences - from coordinating response during such an attack, to managing the recovery post attack, and helping preserve the health and environmental security of the first responders and the public. The proposed program seeks to develop a pilot effort to showcase the end-to-end management, from coordinating response to preserving health and environmental security in Georgia and Albania. This is the first SPS Multi-Year Project with Albania.

G6290 • ARW – 'Advanced Functional Materials for Next-Generation Thin-Film Photovoltaics'

September 2024, Samarkand, Uzbekistan
Participating countries: Germany, Uzbekistan

The primary goal of this advanced research workshop was to provide a forum for discussion on the next generation of thin-film photovoltaics (solar cells), and their practical applications. The focus was to introduce the current research in the field to the academic community of the NATO partner countries of Central Asia, Caucasus and the Middle East, and to foster academic exchange with the scientists from these countries. Several research groups were established or agreed to establish close cooperation and follow-up visits.

Partners across the Globe

Outside of its formal partnership structures, NATO cooperates with a range of countries – called Partners across the globe – on an individual basis. NATO SPS's engagement with these global partners is taking on increasing importance in a complex security environment, where many of the challenges the Alliance faces are global and no longer bound by geography.

For example, NATO is strengthening dialogue and cooperation with its partners in the Indo-Pacific region – Australia, Japan, the Republic of Korea and New Zealand. The Indo-Pacific is important for the Alliance, given that developments in that region can directly affect Euro-Atlantic security. Other partners in this framework include Colombia, Iraq, Mongolia, and Pakistan. In 2024, SPS had 15 ongoing and approved projects with partners across the globe.

G6001 • MYP 'Multi Cable-Driven Robot for Detecting/Detonating Unexploded Mines and Ordnance'

Participating countries: Spain, Colombia, Italy, Slovakia

The landmines and explosive remnants of armed conflicts present the biggest threat to both military forces and civilians. They are responsible for the collateral mortality of civilians long after military conflicts ended. This project application offers a contribution to the problem of delayed progress of mine clearance in Colombia using cable robots. It aims to develop a novel cable-driven robotic device which sweeps large areas of

terrain to detect anti-personnel mines and unexploded ordnances. This project is designed to provide an alternative technical solution to widen the demining clearance.

G6282 • ARW 'Unravelling the Cyber-Physical-Social Infrastructure Climate Change (CPSICC) Nexus Workshop'

May 2024: Washington DC
Participating countries: United States, Australia

The primary objective of this ARW was to bring together those who are conducting state-of-the-art research in the world of detection and monitoring of large ground deformations resulting from natural hazards and to utilize EDTs to establish a strong link between these topics to better prepare and reduce the potential negative impacts of natural hazards. This ARW was proposed to foster communication and collaboration between experts on earth science, remote sensing and AI. The workshop brought experts from various fields of academia, government, and industry from Allies and NATO partners to identify risks and knowledge gaps in the nexus of environmental security, cybersecurity and critical infrastructure.

G7425 • MYP 'Chiral Liquid Crystal plasmonic Biosensor for Detecting Waterborne Pathogens (CLC-BIODETECT)'

Participating countries: Italy, Republic of Korea

In order to minimize the risks of water contamination CLC-BIODETECT proposes the development of an innovative biosensor with the chemical and physical capability to detect harmful pathogens dispersed in potable water in real-time. This project proposes a transformative impact on biosensor technology for CBRN risks, anticipating ultra-high sensitivity and multiplexing capabilities. Successful implementation may lead to commercial applications and inspire advancements in point-of-care diagnostics. This technology strives for a quantitative leap in biosensing efficiency and versatility.

SPS Thematic Realms

To honour the newly adopted SPS Key Priorities, the Annual Report will highlight a curated selection of activities aligned with each priority area, illustrating how they are translated into practice in SPS's mission towards peace and security.

Environmental Security

As NATO has been making strides in embedding environmental considerations into its deterrence and defence posture, NATO SPS works to complement the intra-organizational efforts by providing a platform for joint action to NATO Allies and NATO partner countries on environmental security by design.

In 2024, the SPS Programme engaged with nearly 100 universities and research institutes from more than 40 NATO Allied and partner countries to address pressing issues in environmental security. In order to promote regional and global stability and in alignment with NATO's strategic objectives, SPS projects have contributed to fostering environmental security on topics as diverse as technologies for assessing and protecting critical infrastructure, monitoring soil contamination from military operations and addressing food security issues. The following projects provide examples of SPS's support to NATO's commitment to security through environmental and societal resilience.

G6190 • MYP 'Post-earthquake Monitoring of Seismically-induced chains of Landslide Hazards (SHAKEN) for Protection of Critical Sites and Infrastructure'

Participating countries: Türkiye, Pakistan, United States, the Netherlands
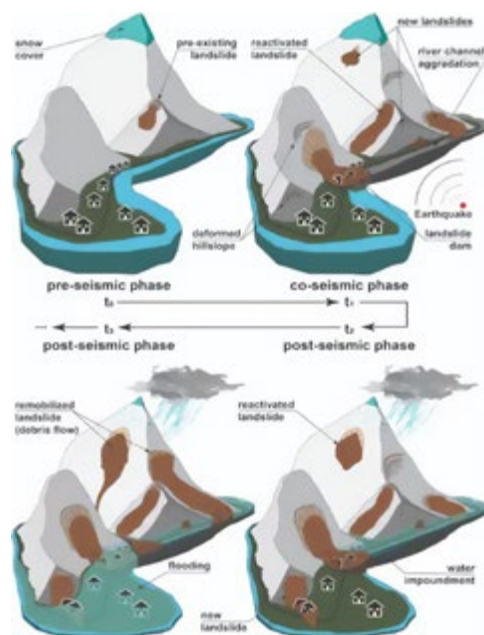
The project was launched in the aftermath of the 6 February 2023 earthquake in Türkiye, in an attempt to minimize the effects of post-seismic perturbations, including landslides, landslide dams, and shattered hillslopes. Leveraging optical images, UAV and LiDAR data processing and InSAR technologies, the project is further expected to deliver a predictive model targeting InSAR-derived surface deformations that will facilitate the timely adoption of mitigation actions. The project will produce technical guidelines for post-event monitoring of critical sites and infrastructure, offering a framework that can be adapted for hazard and safety assessments in earthquake-prone regions globally.

G6296 • MYP 'Improving the monitoring of the state of agricultural land affected by military operations'

Participating countries: Czechia, Ukraine

Russia's war in Ukraine has rendered a significant portion of Ukraine's agricultural land unusable, severely undermining the country's ability to export agricultural products and exacerbating the global food crisis. Co-led by Czechia and Ukraine, this project seeks to determine the level of damage sustained by agricultural land, resulting from compaction, explosions, chemical influence and flooding. The project includes systematic inspections and analyses of soil samples, the production of a documentary movie, and the use of social media campaigns to enhance public awareness.

Energy Security

Energy security - the uninterrupted availability of energy in diverse forms, sufficient quantities and at reasonable prices – is a vital element of resilience and global stability. Allies' ability to access and sustain energy resources underpins their economies, military capabilities, and societal well-being. Supply disruptions, whether through natural disasters, technological failures or deliberate interference, have potential cascading effects on national and international security.

In addition, NATO's approach to energy security focuses on exploiting innovation to maintain the Alliance's technological advantage. Electrification, innovative energy systems and innovative storage solutions are reshaping the energy landscape. NATO SPS supports energy security by fostering innovative projects that have significant impact on global energy security by advancing innovative energy solutions during peace and conflict. In 2024, SPS received 37 applications (22% of proposals) with Energy Security as a key thematic priority.

G6111 • MYP 'Batteries for Low-Temperature Operation < 0C (B-LO Zero)'

Participating countries: United States, Switzerland

The goal of this project is to improve the performance of batteries at low temperatures, thereby increasing their use in a wide range of applications where cold environments are likely to be encountered, such as stand-alone monitoring systems for Internet of Things (IoT) or space applications. The project is set to revolutionise the field of energy security, being of critical relevance for space applications, stand-alone monitoring systems and Internet of Things devices.
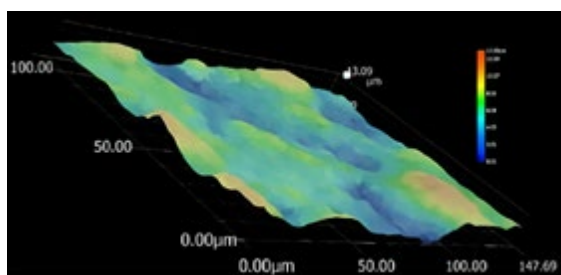
G6245 • MYP 'Development of Quickly Deployable Buildings and their Energy Systems (Q-Built)'

Participating countries: Latvia, Ukraine

Q-Built aims to deliver rapidly deployable temporary buildings with integrated innovative energy systems, that deliver greater resilience, adequate indoor air quality, thermal comfort, and undisrupted energy production for military, civilian, and disaster relief use. The final prototype can be used for military camps, shelters for refugees and support to natural disasters. In addition, the project aims to have a direct benefit for Ukraine, to make military and civilian installations more resilient, in terms of human health and energy security.

G7205 • ARW 'Energy Infrastructure Resilience in Response to War and Other Hazards'

September 2024, Rzeszow, Poland
Organising countries: Poland, Ukraine

The event aimed to bolster energy experts' capacity to swiftly respond to potential energy infrastructure disruptions during military aggression. Utilizing a Laboratory of Virtual Reality, unique network software, and simulated scenarios, a preparation for rapid reaction and maintenance was done. The primary goal was to provide professionals with advanced skills to counteract potential shutdowns, ensuring energy infrastructure resilience against mass disruptions.

This workshop initiative involved experts from countries that have experienced attacks on critical infrastructure during conflicts – especially from Ukraine. Leveraging their invaluable experience, invited experts contributed knowledge applicable to other nations' energy strategies development, facilitating a broader implementation of best practices in energy security.

# Innovation and Emerging Disruptive Technologies

EDTs are changing the way we and our adversaries operate in times of peace, crisis and conflict. EDTs impact our military capabilities, as well as civil preparedness and resilience. SPS has been supporting the Alliance's strategy and demand to maintain a technological edge in support of NATO's core tasks. SPS provides grants to a variety of projects addressing AI, autonomy, quantum, novel materials, and biotechnologies. As part of the renewed SPS key priorities, a new thematic priority, 'Innovation and EDTs', was established to reflect the prioritisation of understanding and adopting EDTs across the Alliance. This was done as a direct reflection of the importance of the topic for NATO.

In the last call of 2024, 38 out of 161 proposals (23%) had EDTs as their key priority. Of these, nine projects have been approved or are currently ongoing. As the projects showcased below demonstrate, SPS funding has supported scientific innovation in the field of EDTs that can vastly improve Allied and NATO partner's technological edge. These projects address key technological advancements such as systems that support AI drone intelligence collection, surveillance and reconnaissance, the use of Virtual Reality (VR) in simulation operations for multi-domain mobility and AI for disaster management and flood detection Below are two projects which reflect the importance of scientific research on EDTs for peace and security.

G7699 • MYP 'Passive Radar Observation and DeTECTion of UAVs via Cellular Networks – PROTECT'

Participating countries: Italy, Estonia, Pakistan

PROTECT aims to develop techniques for identifying UAVs piloted via cellular networks. Two scenarios are considered throughout the project: cooperative and uncooperative networks. Through prototype development and real-world testing, the project aims to validate the effectiveness of the solutions in diverse operational environments. In the future this will open up the possibility to operate drones via the internet from anywhere in the world. Cellular networks offer wide coverage, high data transfer rates, and built-in security features that can enhance the communication link between the drone and the ground control station. New standards offering Ultra Reliable Low Latency Communications may provide a path to widespread adoption of remotely controlled UAVs.
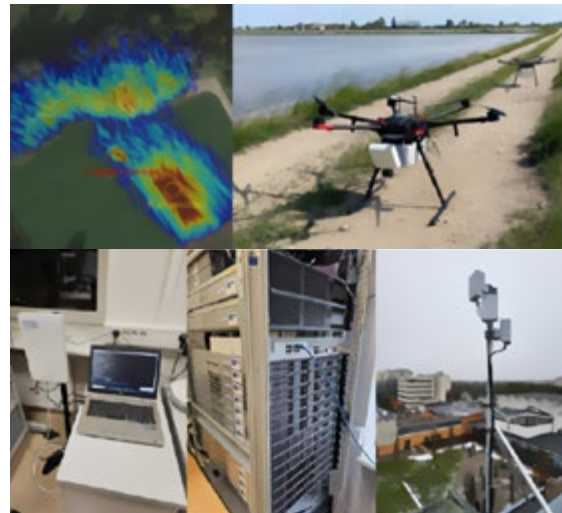
For this reason, it is essential to develop solutions that are able to detect and identify malicious drones piloted over cellular network (5G and beyond).

G6234 • MYP '+Innovative VR Tools for Enhancing the Security of NATO External Borders - VANGUARD+'

Participating countries: Romania, Republic of Moldova

The current geopolitical context with the Russian aggression in Ukraine encompasses various aspects of contemporary warfare including cyber-attacks, destroying of critical infrastructure, and destabilizing actions that affect both regional and international borders. The VANGUARD project intends to develop a toolkit for training the border police personnel using advanced technologies based on cutting-edge VR technologies simulating real life scenarios. The main purpose of the project is to enhance the level of competencies of the Border Police personnel in the participating countries, as well as in other NATO and NATO partners countries. The system consists of both a VR tool kit and of scenario-based training activities.

G6006 • MYP 'Acoustic Multi-Functional Composites for Environmental Risks and Health Hazards Reduction'

Participating countries: Bulgaria, Serbia, Uzbekistan

This multi-year project aims to advance material science and nanotechnology for the production of sound-insulating and sound-absorbing materials that reduce the energy of acoustic radiation, helping to meet acoustic safety and security requirements. This aims to be achieved by using composites of visco elastic polymer components modified with nano-size carbon. The aforementioned composites significantly reduce the noise levels in specific frequency and temperature ranges and will allow the assessment of new properties in acoustic composites and their absorption of electromagnetic radiation on microwave range.

The experimental setup used to study the influence of the dynamic mechanical properties of materials on the structural vibrations of samples made from acoustic materials developed within the project.

G6026 • MYP 'Implementation Vulnerabilities in QKD Components for Fiber and Drone Applications'

Participating countries: United States, Israel, Italy

Quantum cryptography has gained significant attention in recent years, leading to the development of commercial Quantum Key Distribution (QKD) products, i.e., systems according to which an encrypted message is sent over traditional networks, while the keys to decrypt the information are transmitted through quantum means. As communication networks are a fundamental part of today's information technology infrastructure, the rapid advance of quantum technologies is affecting current requirements and capabilities for secure communications. This project has an educational impact: the research topic provides excellent training ground for participating students contributing to the development of a highly skilled workforce in this extremely promising field.

Counter-terrorism

The SPS funded activities in this area emphasize NATO's role in combating terrorism. They support defence against CBRN agents, developments in advanced technologies, border and port security, human and social aspects of security as well as mine and unexploded ordnance disposal. From enhancing cyber security against targeted attacks, to building physical resilience of critical infrastructure, enhancing regional dialogue between Allies and NATO partners, supporting local law enforcement, developing key counterterrorism trainings through workshops, and developing AI to detect drones SPS works to combat terrorism.

G7374 • MYP 'Collaborative Responses to the Role of New Technologies in Terrorist Financing'

Participating countries: United Kingdom, Belgium, Georgia

Since Combating the Financing of Terrorism (CFT) was recognized as a key component of counter-terrorism after 9/11, the financial landscape and architecture that supports it has changed. The simplicity of financial transfers (formal via banks; informal through other value-transfer mechanisms) has been replaced by a multidimensional payment universe of new, technology-based payment mechanisms that make money movements faster, complex and more sophisticated. This Multi-Year Project focuses on the threat posed to Euro-Atlantic security by increasingly sophisticated terrorist financing. It seeks to raise awareness of the threat, develop capabilities to prepare and respond, and enhance engagement among Allies and NATO partner countries. Via the publication and promotion of nine research briefings, accompanying webinars, and podcasts, this project aims to engage the full range of stakeholders required to enhance collaboration in response to tech-enabled terrorist financing.

Chemical, Biological, Radiological, and Nuclear and Explosive Hazards Management

The global CBRN security environment has changed dramatically over the past decade. In response to Russia's illegal invasion of Ukraine in February 2022, NATO has taken steps to significantly strengthen its CBRN defence capabilities, necessary to maintain credible deterrence and defence. SPS, through this key priority, supports NATO's CBRN Defence Policy, the NATO framework that guides the understanding, planning, posture, exercises, training and capabilities assessment for countering CBRN proliferation. A total of 36 SPS project proposals had CBRN as their core priority, amplifying the importance and relevance of CBRN threats.

The following two SPS projects support NATO's CBRN Defence Policy by advancing innovative technologies for the detection and monitoring of biological agents and bioweapons. The DeeP-MaRS project enhances real-time pathogen monitoring in water and air, using AI-assisted systems, aiding rapid response and boosting overall safety. Similarly, the UAV biosensors project integrates cutting-edge nano-technology with unmanned aerial systems to autonomously detect and identify biowarfare threats, mitigating bioterrorism risks. Both initiatives underscore NATO's commitment to strengthening bioanalytical capabilities and safeguarding against CBRN threats.

G6169 • MYP 'DeeP-MaRS: An AI-assisted Bioweapon Detection Platform'

Participating countries: United States, Türkiye, Qatar

DeeP-MaRS proposes the development of a cutting-edge bioweapon detection platform that combines advanced pathogen detection techniques with the predictive power of machine-learning. By integrating multiple physical sampling methods with AI algorithms, the system is expected to accurately identify airborne and waterborne microorganisms, including bio-threat agents.
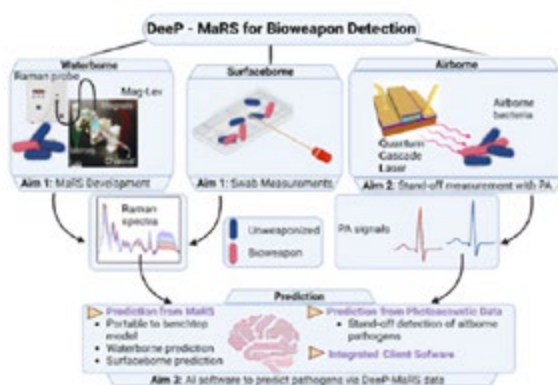
One of its core objectives is to enable the real-time monitoring of drinking water pathogen levels and thus accelerate the reaction time of civil protection bodies.

G6305 • MYP 'Unmanned Aerialn Biosensors for Ultrasensitive Detection of Biological Agents'

Participating countries: United Kingdom, Portugal, Switzerland

This project is developing an autonomous, high-performance bio-analytical surveillance 'sentinel' technology capable of sampling, detecting, and rapidly identifying bacterial biological warfare agents within a secured perimeter.

The overarching vision is to equip UAVs with advanced nanotechnology and optical sensors to enable fast and reliable detection of pathogenic bacteria or spores. In doing so, the project advances bio-analytical capabilities for identifying biological threats. It also offers a novel tool for rapid detection and protection against CBRN agents, with a focus on high-priority pathogens such as Bacillus anthracis. By integrating emerging nanotechnology with UAV platforms, the project supports autonomous surveillance of biohazards and helps mitigate the risks of bioterrorism.

Defence against Hybrid Threats

Hybrid tactics, such as disinformation campaigns, cyber attacks or the coercive use of political or energy-related pressure have long been employed to destabilise societies. In recent years, their frequency, scale and intensity have increased significantly, given the technological developments and global interconnectivity. AsAs the security environment becomes more unpredictable, and hybrid threats more sophisticated, tailored responses are incrementally required. Recognizing this trend, SPS introduced hybrid threats as one of its new key priorities.

SPS supports research and development activities addressing technological solutions and approaches to prepare, deter and defend against the coercive use of hybrid tactics by states and non-state actors. Some activities develop practical tools to monitor, analyse, raise awareness of and counter disinformation.

G7694 • ARW 'CYBERSEC Disinfo Meeting 2024'

November 2024: Krakow, Poland
Participating countries: Poland, Ukraine

The CYBERSEC Disinfo Meeting 2024 took place in the context of the yearly European Cyber Security Forum (CYBERSEC EXPO/FORUM) in Krakow, Poland. The overall objective of this ARW was to deepen the discussion on cooperation between the civilian and defence sectors, specifically in relation to the enhancement of cyber resilience in the sphere of information security. To this end, the event enabled experts from academia, civilian organisations and institutions to collaborate and share best practices to achieve a shared understanding of the problem. Speakers included representatives from the European Centre of Excellence for Countering Hybrid Threats, the European Union, as well as NATO. Through this exchange of best practices for identifying and combating disinformation from the Russian Federation, the initiative strengthened the resilience of institutions and businesses, with a focus on those challenges specific to Central and Eastern Europe.

Resilience

NATO resilience refers to the capacity to prepare for, resist, respond to, and quickly recover from shocks and disruptions. Each NATO member country needs to be resilient in order to withstand a major shock such as a natural disaster, failure of critical infrastructure, or a hybrid or armed attack. Within this thematic priority, he programme has supported activities in the area of civil preparedness, early-warning systems, crisis management, critical infrastructure protection and digital resilience.

G5932 • MYP 'Hybrid Wireless Sensor Network for Early Warning and Identification of Natural Disasters (RESCUE)'

Participating countries: United Kingdom, Morocco, Jordan

Early Warning Systems (EWSs) are one of the major applications for wireless sensor networks (WSNs). EWSs are designed to predict or provide early detection of the presence of a risk requiring a fast response. This initiative seeks to develop EWSs which exploit recent advances in WSNs in order to improve detection accuracy, response time, energy efficiency and reliability, including through the use of hybrid transmission and unmanned aerial vehicles to gather results. The project team uses the latest developments in artificial intelligence and machine learning to develop bespoke algorithms that would further enhance the proposed EWSs.
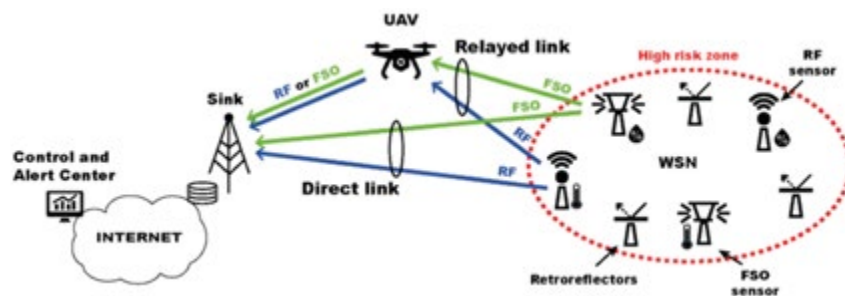
Critical Underwater Infrastructure

As societies become more reliant on CUI, there is an increased call for for enhanced security to protect key infrastructure. SPS supports a variety of projects that monitor the protection of CUI, develop technology towards threat detection and simulate crisis management situations.

G7725 • ARW 'Undersea Communications Cables and Crisis Management'

November 2024: Dublin, Ireland
Participating countries: Iceland, Ireland

Due to their strategic location, Iceland and Ireland are highly reliant on secure and resilient CUI. This Advanced Research Workshop focused on the opportunities and challenges of the unique location and security postures of the two countries in protecting critical undersea communications infrastructure, and in ensuring an effective crisis management response in the event of disruption. It strengthened public-private cooperation and contributed to the development of relevant crisis management protocols and mechanisms in the two countries and beyond. Speakers included high-level and working-level representatives from NATO, governments in Allies and partner countries, industry associations, Centres of Excellence, private sector (cable owners, operators, suppliers), and academia.
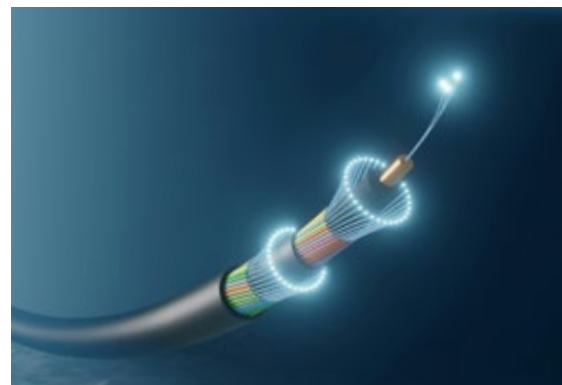
Cyber Defence

NATO and its Allies rely on strong and resilient cyber defences to fulfil the Alliance's three core tasks of deterrence and defence, crisis prevention and management, and cooperative security. The Alliance needs to be prepared to defend its networks and operations against the growing sophistication of the cyber threats it faces. Several SPS activities, which have been mentioned so far, support the thematic priority of cyber defence.

G7200 • MYP 'Accelerating Zero Knowledge Proof (ZKP) for Critical Defence Applications'

Participating countries: United States, the Republic of Korea

Zero-knowledge proof (ZKP) is a cryptographic tool that allows a prover to convince a verifier on the correctness of a statement without disclosing extra information. One of the major obstacles for the adoption of ZKP is the high computation cost of proof generation. The project addresses this challenge by improving the performance of the two most expensive components – multiple scalar multiplication (MSM) on an elliptic curve and polynomial multiplication (PM) in a given ring structure that allows the prover to shift the burden to a server. The project can improve performance of existing ZKP applications and support novel ones. ZKP has huge potential to revolutionize many security-related applications, including but not limited to privacy-preserving intelligence exchange and machine learning, robust and verifiable voting, verifiable computation, anonymous authentication, and verifiable database query.

Assessing and addressing threats posed by the Russian Federation

The NATO Strategic Concept , adopted in June 2022 at the NATO Summit in Madrid, recognises Russia as "the most significant and direct threat to Allies' security".

The SPS activities under this thematic area focus on the development of approaches and tools to counter hostile information activities against Allies and NATO partners. Another aspect analysed by academia and scientists is the identification of trends and lessons learned for hybrid threats emanating from the Russian Federation.

G8083 • MYP 'Improving Allies' Health Systems Security and Resilience to Hybrid Threats and Armed Conflict'

Participating countries: United States, Ukraine and United Kingdom

Building on Ukraine's experience and leveraging contributions from health policy experts and analysts, this MYP aims to develop evidence-based strategies to strengthen the resilience of health systems in the face of armed conflict and hybrid threats. Using advanced systems analysis and mixed research methods, the project will model how such threats disrupt health infrastructure and examine their downstream impact on security and economy. The project's cross-professional nature will bring together experts who face similar problems, creating a platform for knowledge sharing across healthcare and security sectors.

Strategic Foresight

The newly-introduced key priority seeks to identify and evaluate the drivers of change shaping the security environment. By examining the root causes of emerging trends and developing plausible scenarios, it enables more robust evaluations of their potential implications. SPS works to support NATO's strategic foresight efforts by funding projects that address key trends in international security, regional security and defence strategies, as well as the development of early warning systems.

G7635 • ARW 'Navigating Gray Zones - Building Resilience in State and Non-State Institutions in the Era of Hybrid Warfare'

October 2024: Yerevan, Armenia
Organizing countries: Poland, Armenia

This workshop contributed to the understanding and mitigation of hybrid challenges. By bringing together experts from academia, think tanks and governments, it fostered knowledge exchange and contributed to the development of related policies. The event focused on building a collaborative network within the region, particularly between Poland and Armenia. Formulating recommendations relevant for NATO, and increasing awareness about the complexities of hybrid threats in the current geopolitical context.

Human and Social Aspects of Security

Under this thematic area, key priority, SPS supports activities with human security lead topics, Women Peace and Security and cultural and social aspects in operations and missions. For NATO, human security encompasses five areas: combatting trafficking in human beings protection of children in armed conflict, preventing and responding to conflict-related sexual violence, protection of civilians, and cultural property protection. Another angle of this thematic priority pertains to community resilience.

G6181 • ARW 'Addressing Systemic Legal and Policy Challenges of Mercenaries and Related Actors in Contemporary Armed Conflicts: Beyond the Wagner Group'

March 2024, Copenhagen, Denmark
Organizing countries: Denmark, Switzerland

In March 2024, the University of Copenhagen and the Geneva Centre for Security Sector Governance brought together more than 50 experts a two-day advanced discussion on the legal and policy challenges posed by mercenaries in contemporary armed conflicts. Participants included diverse representatives from NATO Allies and partner countries academia, civil society, and international and regional organisations.

G6119 • MYP 'Increasing the Capacity of Local Communities to Counteract Crisis Situations'

Participating countries: Poland, Ukraine

The willingness and ability of citizens to help implement the crisis management policies put in place by municipal authorities is crucial to a community's crisis response capability. This project aims to identify mechanisms of governance capacity, legitimacy and social resilience, investigating the capacity of communities in Poland and Ukraine to respond to and manage crises. The project will lead to the development of an a common mechanism that improves the efficiency of their emergency management systems.

This project aims to raise awareness of the local community through participation in training courses, which will support community members response to crises. In addition, an interactive textbook will be published and made available to the public.

Operational Support

SPS supports activities that identify and promote best practices in operations and missions and that provide civilian support to these efforts.

G6295 • ATC 'Enhancing Ukraine's Capacities to Manage Trauma-Related Mental Disorders'

March: Ivano-Frankivsk, Ukraine
Participating countries: Canada, Ukraine

Post-Traumatic Stress Disorder (PTSD) is a common operational stress injury in war-stricken areas, affecting civilians and military personnel, as well as posing security and safety risks. Following Russia's war of aggression against Ukraine, the rate of PTSD has increased dramatically, straining local mental health resources and preventing civilians and military from optimally performing everyday duties. The ATC provided training to mental health professionals to better manage and treat Ukrainian patients, thereby allowing civilians and military personnel to recover more quickly and resume their roles in society. The event laid the groundwork to scale up training in other regions of Ukraine, through the creation of a training document.

Conclusion

2024 marked a significant year in SPS history. The streamlining of our key priorities and development of new goals shaped much of the Programme's work. Breaking the record for most applications received showed the increasing demand and support for the Programme. The record number of proposals also reflects the significant focus of the Alliance on supporting our collaboration with NATO partners through scientific research.

As we embark on new challenges and opportunities in 2025, we can look back on the developments and successes from 2024 and how it will reflect our work in the future. Increasing geopolitical tensions caused by hybrid warfare, the rapid development of EDTs, and growing geopolitical and environmental security implications are some of the challenges the Alliance faces. SPS continues to foster cooperation among Allies and NATO partners through vital R&D to address some of these challenges.

In 2024 we launched our new list of key priorities. The update was made to align SPS's priorities with NATO's evolving strategic objectives. The new priorities represent not only the priorities of the Alliance but also key focus points for opportunities within the Programme itself. These priorities reflect the rapid development of technological innovation in an increasingly uncertain security paradigm.

Through these core priorities as well as the changes made within the organisation of the Innovation, Hybrid and Cyber division, SPS has been given opportunity to reflect upon its mission. Assessing these changes has helped to streamline the ambition of the Programme. Last year SPS launched several high-level initiatives that will continue into the next years.

For example, we supported the first SAPIENCE Autonomous Drone Competition in London, a milestone achievement for the SPS Programme. Four teams from universities across the Alliance and partner countries participated. The next editions of the competitions will take place in the US and the Netherlands in 2026.

SPS's cooperation with Ukraine remains strong. Proposals involving Ukraine account for 30% of total proposals received, making Ukraine the NATO partner country with the largest number of ongoing projects with NATO SPS. Amid Ukraine's fight against Russian aggression, the country's academics have continued to develop and participate in projects with Allied institutions, maintaining a strong link between Ukraine's scientific community and the Alliance, especially on the topics of advanced technology, energy security and CBRN defence.

The record number of applications signifies the renown and success of the Programme. The update of our key priorities reflects our commitment to the Alliance's goals as well as a recognition of the transforming security landscape. New challenges create space for scientific discovery and innovation. Scientific research within SPS projects shows successful cooperation between Allies and NATO partner countries. As we embark on next year's objectives, we can reflect on our successes, transformations, partnerships and lessons learned to equip us for the challenges ahead.

2024 Projects and their Priorities

Annex: The Independent Scientific Evaluation Group 2024

The ISEG is composed of scientists and experts nominated by NATO countries and appointed by the Partnerships and Cooperative Security Committee (PCSC) for a mandate of three years. Once appointed, ISEG members do not represent their respective nations. They are selected on the basis of their scientific and technical expertise in one or more of the SPS Key Priorities, as well as their experience and potential to contribute to the Group's work. The NATO Science and Technology Organisation (STO) also nominates up to two experts as members of the ISEG.

The main role of the ISEG is to evaluate the scientific and technical merit of SPS applications. ISEG members contribute to defining the boundaries of SPS Calls for Proposals, as they can help to identify research trends and future focus areas. In addition, the ISEG members follow and evaluate ongoing SPS projects in their areas of expertise by acting as 'godparents'. This direct involvement of the scientific community is indispensable for the integrity and maintenance of the high scientific standard of the SPS Programme.

At the end of 2024 the ISEG was composed of 39 experts

- **Dr. David Alexander,** United States
- **Dr. William Andrews,** Canada
- **Dr. Markku Antikainen,** Finland
- **Dr. Konstantinos Balomenos,** Greece
- **Prof. Miguel Bastos Araujo,** Portugal
- **Dr. Emmanuel Bresson,** France
- **OF-2 Samuel Colin**, France
- **Dr. Tamás Csiki Varga,** Hungary
- **Prof. Dr. Uros Cvelbar,** Slovenia
- **Prof. Mihai Datcu,** Romania
- **Dr. Todor Dimitrov,** Bulgaria
- **Prof. Philip Thomas Dyson,** United Kingdom
- **Dr. Joan Farnos Baulenas,** Spain
- **Assoc. Prof Lucia Figuli,** Slovakia
- **Prof. Dr. Matteo Gerlini,** Italy
- **Col. Dr. Zoltán Jobbágy,** Hungary
- **Dr. Bernadette Johnson,** United States
- **Assoc. Prof Stamatios Kalligeros,** Greece
- **Dr. Cagatay Karabat,** Turkiye

- **Dr. Athanasios Karmperis,** Greece
- **Dr. Ville Lehtola,** Finland
- **Prof. Dr. Gabriele Lenzini,** Luxemburg
- **Col. Dr. Andrzej Lis,** Poland
- **Dr. Wojciech Lorenz,** Poland
- **Col.Assoc.Prof Petar Marinov,** Bulgaria
- **Assoc. Prof Karol Nemoga,** Slovakia
- **Dr. Ulrik Neupert,** Germany
- **Prof Erika Ottaviano,** Italy
- **LtCol. Antonio Palermo,** Italy
- **Prof. Karri Palovuori,** Finland
- **Mr. Raul Rodriguez Sanchez,** Spain
- **Assoc. Prof. Mariusz Ruszel,** Poland
- **Dr. Peter Simkens,** Belgium
- **Dr. Rocio Sanchez-Montero,** Spain
- **Mr. Jonas Schöttler,** Germany
- **Dr. Ing. Frantisek Simancik,** Slovakia
- **Assoc.Prof Hana Stredova,** Czechia
- **Dr. Gerald Walther,** Germany
- **Capt. Salvatore Calabro,** Representative of the STO

Annex: SPS Grant Mechanisms

Multi-Year Projects (MYPs)

MYPs are Research and Development (R&D) projects. They enable scientists from NATO and its partner nations to collaborate on applied R&D and capacity building projects that result in new scientific 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. Projects involving more than one NATO and one partner nation are encouraged, as is the participation of young scientists. These projects have an average duration of two to three years.

Advanced Training Courses (ATCs)

Through ATCs, specialists share their security-related expertise in one of the SPS Key Priority areas with participants from NATO and NATO partner countries. ATCs are not intended to be lecture-driven, but to be intensive, interactive and practical in nature. Courses contribute to the training of experts in partner nations and enable the formation and strengthening of international expert networks. These tailor-made modular courses respond to the needs of partner nations. Trainees are chosen based on their qualifications and experience, and the benefits they may draw from the ATCs in their future activities. ATCs typically take place over five to seven working days.

Advanced Study Institutes (ASIs)

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. An ASI lasts roughly seven working days. Lecturers of international standing report on new advances in different aspects of security-related civil science to pre- and post-doctoral level scientists with relevant backgrounds in the subject. Young scientists from NATO partner nations are especially encouraged to participate.
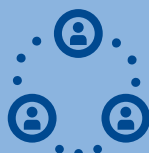
Advanced Research Workshops (ARWs)

Advanced Research Workshops (ARW) 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 action to address contemporary security challenges, and often are the starting points for follow-on activities such as SPS Multi-Year Projects. ARWs typically take place over two to five days and gather 20-50 participants.