The Emerging Security Challenges Division

NATO Science for Peace and Security (SPS) Programme




2018 Annual Report

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Preface by Dr. Antonio Missiroli

60 years of Science at NATO!

In November 2018, we were joined by NATO Deputy Secretary General Rose Gottemoeller to celebrate the 60th anniversary of the Science for Peace and Security Programme. The anniversary was an excellent opportunity to display prototypes built by SPS experts in an exhibition, to award the NATO SPS Partnership Prize to three outstanding Multi-Year Projects, and to listen to keynote speeches by NATO and Partner country Ambassadors on the value of the SPS Programme.

Today the Science for Peace and Security Programme is undoubtedly a key feature of NATO Partnerships, contributing to Allied and international security. In 2018, the Programme continued to successfully reach out to Partner countries in the East, the South, and at the global level for non-military practical cooperation, building bridges and fostering partnerships. Of note are the SPS Programme's contributions to the promotion of regional cooperation in the Western Balkans through a project in the field of emergency response, as well as the implementation of training programmes on CBRN agents, cyber defence and critical energy infrastructure protection at the NATO-ICI Regional Centre in Kuwait throughout 2018.

Just like NATO itself, over the past 60 years, the SPS Programme has proven its adaptability to the ever-changing security environment, closely following Allied political agendas and aligning with NATO's Strategic Objectives. In 2018, its activities continued to be tailored to the needs of Partners in terms of capacity building, technological innovation and the involvement of civil society. While implementing actions as part of Defence and Related Security Capacity Building packages for Iraq, Jordan, the Republic of Moldova and Georgia, the SPS Programme continued to develop new initiatives under the Defence Capacity Building umbrella with Tunisia. These included cyber defence, counter improvised explosive devices training, and the implementation of UNSCR 1325 on Women, Peace and Security. Furthermore, the SPS Programme actively contributed to NATO's efforts in support of the international community's fight against terrorism. One example of this is *DEXTER*: a flagship project on the real-time detection of explosives in mass transit environments.

The SPS Programme underpins the Allies' commitment to expand practical cooperation with any Partner nation that shares the Alliance's values, and to focus on international peace and security. The first practical cooperation between NATO and Colombia, another SPS activity, is just the latest example of this commitment.

60 is usually the age to start slowing down and thinking about retirement – not for SPS! I am confident that SPS will keep making important contributions to further develop and deepen NATO's Partnerships so that they continue to meet the interests of both Allies and Partners.

I wish you a pleasant and interesting read through the 2018 SPS Annual Report.

Dr. Antonio Missiroli

Assistant Secretary General

NATO Emerging Security Challenges Division

Foreword by Dr. Deniz Yüksel-Beten

This year marks the 60th anniversary of the launch of the Science Programme, and of scientific cooperation at NATO. Over time, the Programme has adjusted its focus from cutting-edge science to tackling NATO's key priorities. Now known as Science for Peace and Security (SPS), the Programme conducts its work in alignment with the Alliance's Strategic Objectives, developing and supporting initiatives in the context of NATO's partnership commitments and priorities, such as Defence and Related Security Capacity Building Initiative, Comprehensive Assistance Package for Ukraine, Engaging with the South, and Projecting Stability in NATO's neighbourhood.

Addressing NATO's Strategic Objectives through tangible, output oriented, flexible and demand driven collaborations, the SPS Programme maintains its focus on supporting and strengthening practical cooperation. Reaching this milestone did not stop SPS from continuing to attract the talent of scientists and researchers from Allied and Partner countries, maintaining NATO's dynamic connection with the scientific community. This year was indeed rich in initiatives that highlighted the Programme's important role in scientific innovation and research across NATO and Partner nations. The anniversary also provided an opportunity to look back on past successes.

In 2018 alone, SPS conducted over 150 activities across its key priority areas, which range from Counter-Terrorism and Advanced Technologies to Human and Social Aspects of Security. Moreover, following rigourous peer review, the Independent Scientific Evaluation Group recommended 49 new SPS activities, of which 40 were approved by NATO's Partnerships and Cooperative Security Committee for their alignment with the Alliance's priorities. The development of these activities involved 22 Partner countries, who came together with Allies to initiate joint activities (workshops, trainings and multi-year projects).

Online and offline, the Programme continued to highlight NATO's contribution to security-related civil science cooperation. In the framework of the SPS Programme, eight NATO Science Series volumes were published, and multiple web stories and articles on the Programme's dedicated website steered the public's attention to the accomplishments of SPS multi-year projects, workshops and training courses. The Programme also promoted its achievements and opportunities for scientists via two SPS Information Days, one in Hungary and the second in Poland. These activities enabled face-to-face exchanges with officials and the scientific community, sparking discussions on lessons learned and future collaboration involving current SPS project leaders and experts from host countries.

In an exciting year, which was marked by the Brussels Summit and NATO's move to new Headquarters, SPS celebrated its 60 years as a flexible and versatile programme that provides support to joint and collaborative research and development projects that lead NATO's modernisation.

This report provides an overview of the multidisciplinary work of the Programme and of its key flagship projects of high public diplomacy value. I hope you will enjoy reading it.

Dr. Deniz Yüksel-Beten

Senior SPS & Partnership Cooperation Advisor

NATO Emerging Security Challenges Division

EXECUTIVE SUMMARY

The Science for Peace and Security (SPS) Programme provides expertise and financial support for tailor made, security-related activities. Its flexible and versatile approach to practical scientific cooperation and capacity building contributes to advancing NATO's partnership priorities, as each SPS initiative requires active engagement by stakeholders from both Allied and Partner countries. The Programme is instrumental to promoting knowledge-sharing, building capacity, and projecting stability outside of NATO countries.

SPS activities include workshops, training modules, and multi-year projects, and follow requests and priorities as decided by Allies and Partners. In addition to these top-down initiatives, the Programme supports bottom-up proposals submitted by researchers and experts interested in cooperating in the SPS framework. The Programme operates under the political guidance of the Partnerships and Cooperative Security Committee (PCSC), and its priorities are aligned with NATO's Strategic Objectives. SPS absorbs Allied guidance in the initiatives it supports and implements in order to tackle emerging security challenges with a dynamic approach.

Celebrating 60 years of excellence

Building on the legacy of the Science Committee established in 1958, SPS continues to advance NATO's involvement in security-related civil science and technology. It achieves this by engaging NATO nations and Partners in practical, results-driven cooperation that addresses shared challenges. 2018 presented the Programme with an opportunity to look back at its history and achievements, and to acknowledge the outstanding contributions made by recently completed SPS projects. For this purpose, a special celebration was held in November 2018, in the presence of high-level representatives from NATO nations and Partner countries, as well as members of the scientific community. On this occasion, the SPS Partnership Prize was awarded to three outstanding SPS research and development projects in the fields of Advanced Technologies, Cyber Defence, and Defence against Chemical, Biological, Radiological, and Nuclear (CBRN) Agents. Hands-on results of SPS projects were displayed, and interactive demonstrations with prototypes took place during an SPS exhibition at NATO's new headquarters.

Celebrations for the 60th anniversary of SPS at NATO HQ. © NATO

Implementing security-relevant initiatives

Over the past decade, the SPS Programme supported over 800 projects involving NATO nations and Partners. In 2018, 27 trainings and workshops were carried out, engaging over 1850 experts, researchers and young scientists. Moreover, 21 SPS multi-year projects were completed. Among them, top-down projects engaged Partners both in the South and in the East.

For instance, the project "Comprehensive Package for strengthening Jordanian C-IED defence capabilities", led by Spain and Jordan, trained 136 officers of the Jordanian defence and security forces in dealing with the threat of Improvised Explosive Devices (IEDs). Building on previous NATO capacity building efforts and benefiting from the involvement of the NATO C-IED Centre of Excellence, Jordanian Armed Forces and the Irish Defence Forces Training Centre, this project contributed to reducing the risk from IEDs for members of the military and civilians in Jordan.

In the field of counter-terrorism, 2018 saw the kick-off of the project "Microwave Imaging Curtain", led by France and Ukraine, and with the participation of the Republic of Korea. The initiative will develop imaging devices for use in public transport settings without interrupting the flow of pedestrians, and fits under the DEXTER (Detection of EXplosives and firearms to counter TERrorism) consortium. The consortium, which will be launched in 2019, aims to create an integrated system for the real-time detection of firearms and explosives in mass transportation systems, and brings together three projects led by different Partners.

This flagship initiative features prominently in SPS efforts in support of the Action Plan on Enhancing NATO's role in the International Community's Fight Against Terrorism, and aligns with the guidance provided at the 2018 Brussels Summit.

Fostering practical cooperation

145 grant applications were submitted to SPS for consideration in 2018, of which 107 met the eligibility requirements for funding and were thus reviewed by members of the Independent Scientific Evaluation Group (ISEG).

The multi-disciplinary group of experts appointed by Allied nations carried out a peer review of the applications for their scientific and technical merit, and met on two occasions in Brussels to issue recommendations for which projects to support. Of the 49 applications recommended by ISEG, 40 were approved by Allies during 2018.

Of the 40 approved project applications, approximately 30% were top-down, resulting from negotiations with NATO nations and Partners. Over half of the successful project applications were Multi-Year Projects, focusing on applied research and development and capacity building, lasting on average 2-3 years.

Tackling security challenges with Partners

SPS activities are an integral part of NATO's active engagement with Partner countries and contribute to projecting stability and building capacity in its neighbourhood. The 40 new SPS activities approved in 2018 involved 22 different Partner countries. Partners engaged in the Euro-Atlantic Partnership Council and Mediterranean Dialogue featured most prominently. Moreover, following political guidance from Allies on practical cooperation with Ukraine, seven new activities falling under the NATO Ukraine Commission were approved.

Of the activities approved in 2018, the most common thematic areas were Counter-Terrorism, Advanced Technologies and Cyber Defence.

Adding high public diplomacy value

As an operational programme focusing on practical cooperation, SPS activities have high public diplomacy value. By cooperating with NATO's Public Diplomacy Division, Contact Point Embassies and Liaison Offices, the Programme enjoyed wide visibility and featured prominently in the Secretary General's Annual Report 2018. In addition, SPS provided updated information on ongoing activities via its online tools.

SPS also organised two *Information Days* in 2018, to raise awareness on current projects and enable participants to exchange views on future cooperation within the framework of the NATO SPS Programme. The events took place in Budapest, Hungary and in Warsaw, Poland, with the support of the countries' respective national delegations to NATO. The events involved high-level speakers from local national ministries, as well as project participants and ISEG members, and engaged a wide audience of scientists, experts and policy makers.

What next?

Moving into its seventh decade of existence, the Programme will continue to engage Partner countries through all of NATO's partnership frameworks. It will bring forward NATO's objective of projecting stability through the Defence and Related Security Capacity Building Initiative, and support civil research initiatives focusing on cyber defence and hybrid challenges, counter-terrorism and advanced technologies. With innovation at its heart, the Programme will contribute to cooperation with other international organisations, such as the European Union, as well as with Partners to the East and the South of the Alliance, and across the globe.

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List of Abbreviations

ACSRT	African Centre for the Study and Research on Terrorism
ARW	Advanced Research Workshop
ASI	Advanced Studies Institute
ATC	Advanced Training Course
AU	African Union
CAP	Comprehensive Assistance Package
CBRN	Chemical, Biological, Radiological, and Nuclear
C-IED	Counter-Improvised Explosive Devices
CoE	Centre of Excellence
CT	Counter-Terrorism
DASG	Deputy Assistant Secretary General
DCB	Defence and Related Security Capacity Building Initiative
DEXTER	Detection of EXplosives and firearms to counter-TERrorism
DSG	Deputy Secretary General
EADRCC	Euro-Atlantic Disaster Response Coordination Centre
EAPC	Euro-Atlantic Partnership Council
ESCD	Emerging Security Challenges Division
EU	European Union
ICI	Istanbul Cooperation Initiative
IESMA	Innovative Energy Solutions for Military Applications
IO	International Organisation
IPAP	Individual Partnership Action Plan
IPCP	Individual Partnership Cooperation Programme
ISEG	Independent Scientific Evaluation Group
MAP	Membership Action Plan
MD	Mediterranean Dialogue
MENA	Middle East and North Africa
MYP	Multi-Year Project

NATO	North Atlantic Treaty Organisation
NCIA	NATO Communications and Information Agency
NICS	Next-generation Incident Command System
NUC	NATO-Ukraine Commission
NSPA	NATO Support and Procurement Agency
OSCE	Organisation for Security and Co-operation in Europe
PaG	Partners across the Globe
PCSC	Partnerships and Cooperative Security Committee
SPS	Science for Peace and Security
STANDEX	STANd-off Detection of EXplosives
STO	NATO Science and Technology Organisation
UAV	Unmanned Aerial Vehicles
UN	United Nations
UNSCR	United Nations Security Council Resolution
UXO	Unexploded Ordnance
WHO	World Health Organisation
WMD	Weapons of Mass Destruction
WPS	Women, Peace and Security

INTRODUCTION

2018 marked a year of celebration for the SPS Programme and provided an opportunity to look back at 60 years of Science at NATO. It has also been a year for horizon-scanning as Heads of State and Government gathered in Brussels to give direction to a modern Alliance that continues to adapt to new security challenges. In a move symbolic of its modernisation, NATO assumed its new Headquarters in 2018. The Organisation continues to project stability through a rich network of Partners, scientists and researchers by engaging them in political consultation, dialogue and practical cooperation.

The 2018 Annual Report offers an excellent opportunity to review SPS activities conducted and completed over the year.

- First, it presents a snapshot of the 60th Anniversary celebration and provides a quick overview of the "*what, who and how*?" of the SPS Programme today.
- Second, the Report highlights the political priorities set out by the 2018 NATO Summit, which anchored the Alliance and SPS more specifically in the direction of modernisation and innovation. It looks at the impact of Summit decisions on the 2019 SPS Work Programme. Furthermore, the Report outlines how regional cooperation was reaffirmed, and how SPS activities continue to project stability with a significant contribution in terms of Defence Capacity Building (DCB) in the South, but also in the East. It also identifies how SPS continues to enable NATO to reach out to global Partners and to other international organisations through Multi-Year Projects, Advanced Training Courses, Advanced Study Institutes, and Advanced Research Workshops, under all partnership frameworks.
- Third, the Report offers relevant facts and figures, and a concrete perspective on SPS as a solid Partnership programme, building networks among scientists, and supporting research and development in all Partner countries.
- Finally, the Report highlights 2018 key flagship events and underlines the high public diplomacy value of SPS, enhancing the visibility of NATO through various means: from SPS Information Days in Allied and Partner countries, to SPS contributions on its Website (https://www.nato.int/science) and social media, particularly via its Twitter account (@NATO_SPS).

This Report also includes a series of special tables of facts and figures related to SPS activities in 2018 (Chapter 3), and annexes providing details on new activities and completed Multi-Year Projects.

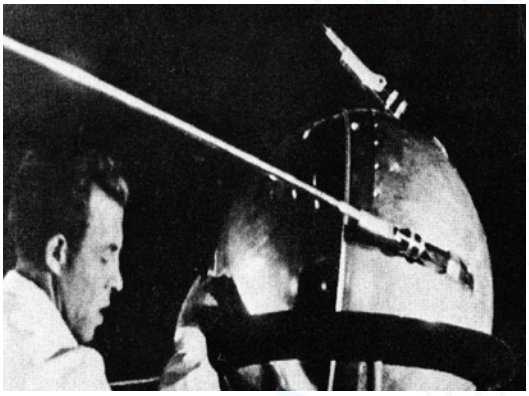
CHAPTER 1

Celebrating SPS, a well-established NATO Brand

60th Anniversary: Science at NATO reached another milestone

FROM THE SCIENCE PROGRAMME TO THE SPS PROGRAMME.

For 60 years, the NATO Science Programme, and subsequently the SPS Programme, have promoted practical cooperation in the field of civil science and technology in order to address emerging security challenges. Science at NATO can be traced back to 1957 when the Foreign Ministers of Canada, Italy and Norway, known as "The Three Wise Men", recommended cooperation among Nations in the non-military field to foster ties amongst civilian communities of the Alliance.



Technician putting the finishing touches on Sputnik 1. © NASA/Asif, A. Siddiqi

This new initiative was triggered by the launch of *Sputnik*, which clearly demonstrated the gap between Soviet and Allied missile technology.

The subsequent creation of the NATO Science Committee in 1958 marked the beginning of NATO Science fellowships, promoting research and development in Allied countries. Throughout the Cold War, the Programme delivered substantial achievements through modest investments, overcoming the security divide among Allies.

First Science Committee meeting. © NATO

Going beyond hard science in 1969, the Programme extended to environmental security with the creation of the Committee on the Challenges of Modern Society.

With the collapse of the Soviet Union at the end of the Cold War, NATO reached out to countries of Central and Eastern Europe. The Science Programme thus shifted its geographical scope from an intra-Alliance to an Alliance-Partner focus. With the signing of the Founding Act between NATO and the Russian Federation in 1997, the Science Programme developed activities with Russian scientists in the fields of counter-terrorism, CBRN and transport security. Many research projects addressed the Cold War legacy, notably in Azerbaijan and Uzbekistan with the Conversion of Abandoned Liquid Ballistic Missile Propellants, but also in the Republic of Moldova with the establishment of an Analytical Laboratory for the Analysis of Pesticides. Reflecting the political and technological developments of the 90s, the Science Programme focused primarily on activities related to environmental security and computer networking, establishing, for example, the Virtual Silk Highway by working with countries of Central Asia and the Caucasus.

In 2006, the actual SPS Programme was launched by merging the Science and CCMS Committees to support practical cooperation with Partner countries in civil science and innovation. In the following years, the SPS Programme mirrored NATO's political agenda with a set of new key priorities addressing emerging security challenges, NATO-led operations and missions, and early warning and forecasting of disasters and crises. It also contributed significantly to NATO's agenda on Women, Peace and Security.

Detail of the SPS-supported Virtual Silk Highway. © NATO

Looking back on the past 60 years, the SPS Programme has gone through important changes, successfully streamlining its efforts for greater efficiency and oversight, and adapting to new circumstances and global threats. Today, its mandate is to strengthen security through joint practical cooperation between Allies and Partners, reflecting NATO's political agenda and focusing on key priority areas, with projects on cyber defence, counter-terrorism, hybrid warfare, resilience and capacity-building.

Over the past decade, the SPS Programme has initiated nearly 800 collaborative activities among the Alliance's 29 member states and 40 Partner countries, ranging from cyber defence in Jordan to humanitarian demining in Ukraine.

In a volatile and fast-changing world, SPS activities provide NATO with a much-needed horizon-scanning opportunity, raising Allies' awareness when it comes to new challenges and various opportunities. Its role has been and remains to be finding solutions to new challenges, primarily through non-military means, in the spirit of cooperation and solidarity, promoting peace through science around the world.

Italian Ambassador Claudio Bisogniero described the SPS Programme as "a truly unique tool to foster scientific and technological cooperation between Allies and Partners, while reinforcing the image of NATO also as a 'soft power' organisation, and therefore its role as a political actor on the world stage".

TODAY WE CELEBRATE!

A special event was held at NATO Headquarters in Brussels on 29 November 2018, to celebrate the 60th anniversary of the Alliance's leading initiative for science, innovation and research. NATO Deputy Secretary General (DSG) Rose Gottemoeller opened the anniversary celebrations with welcoming remarks and observations on the importance of scientific advancement in the context of security.

Celebrating the 60th Anniversary of the SPS Programme, NATO Deputy Secretary General Rose Gottemoeller stressed that "it is science that provides our understanding of emerging security challenges, and it is science that underpins our solutions".

Scientists, diplomats and high-level officials both from NATO and Partner nations gathered at NATO Headquarters to mark the event. An exhibition of posters and a demonstration of prototypes provided an opportunity to interact directly with 25 scientists and experts behind SPS projects, and to learn more about the results of their dedicated work. Projects supported by the SPS Programme were on display, including a new remote controlled device that uses subsurface radar to detect mines and other explosives.

Sheikh Fawaz Al-Sabah of Kuwait, and the Ambassadors to NATO of Italy, Ukraine, Azerbaijan and Serbia gave speeches highlighting the benefits of the SPS Programme. Assistant Secretary General for Emerging Security Challenges, Dr. Antonio Missiroli, closed the event stating: "*Innovation is a buzz word at NATO these days, and I am convinced that the SPS Programme will play a front line role in NATO's future, promoting peace through science, in the spirit of cooperation and solidarity, both for Allies and their Partners.*"

Sheikh Fawaz Al-Sabah referring to the importance of the NATO-ICI Regional Centre that was opened in Kuwait in January 2017 stressed that "the SPS Programme has contributed not only towards strengthening global stability but has also shed a light on our region".

This high level event commemorated and highlighted key achievements of the SPS Programme by awarding the SPS Partnership Prize to three outstanding completed Multi-Year Projects, in the following fields: cyber defence; defence against chemical, biological, radiological and nuclear (CBRN) agents; and advanced technologies.

Ukrainian Ambassador Vadym Prystailko stated that "Ukraine recognises SPS as a true and devoted friend, which has supported Ukrainian scientists for more than 20 years. We are committed to keep the level of cooperation high, and I look forward to new mutually beneficial projects in future".

NATO DSG Rose Gottemoeller awarded the Prizes for the following projects:

- "Secure Implementation of Post-Quantum Cryptography" for research on post-quantum cryptography with a particular focus on the security of cyber infrastructures and of communication channels. Slovakian experts cooperated with Israeli, French and American scientists.
- "The Anthrax Protein Transporter: Structure, Functional Dynamics and Drug Discovery" for research on neutralising anthrax and developing chemical compounds that could inhibit the transport chain of bacillus anthracis inside the human body and therefore decrease its virulence. Researchers involved came from Turkey and Israel.
- "Compact Sensor System for Unmanned Aerial Vehicles" for the development of a compact, low-weight and low-power consumption sensor to be mounted on Unmanned Aerial Vehicles (UAVs) that can detect, identify and localise electromagnetic signals in the battlefield, thus improving the monitoring of potential targets. The project involved researchers from Spain, Republic of Korea und Ukraine.

A short video was produced to portray the history of today's Programme and highlight its key achievements. It was screened at the event commemorating the 60th Anniversary[1].

NATO DSG Rose Gottemoeller awarding the NATO SPS Partnership Prize to three outstanding SPS Multi-Year Projects in the fields of Cyber Defence, Defence against CBRN Agents, and Advanced Technologies. © NATO

The event was closed by Dr. Simone Turchetti, who presented and discussed his book "*Greening the Alliance: The diplomacy of NATO's Science and Environmental Initiative*". The book recalled NATO's scientific patronage – and the motivations behind it – from the organisation's early days to the dawn of the 21st century.

1 The video is publicly available at the following link: https://www.youtube.com/watch?v=iVWCUG-n5H8

SPS today: What, Who, How?

The NATO SPS Programme is aligned with NATO's Strategic Objectives, and focuses on cooperation with Partner countries by providing funding, scientific and technical expert advice, and support to tailor-made, security-related activities through established grant mechanisms. With limited resources, the Programme brings significant opportunities to research and scientific communities both in NATO and Partner countries. This allows the advancement of knowledge to push forward technical frontiers, and build lasting networks among scientific communities.

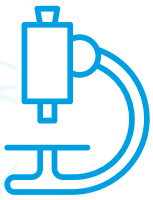
The SPS Programme provides the Alliance with additional, non-military communication channels between NATO and Partner nations, often in countries and regions where other forms of dialogue directly focused on defence and security would prove challenging. Accordingly, it enables NATO to establish the first concrete practical cooperation with new Partners.

Demonstration of artificial human disposable skin patches developed in the framework of the SPS MYP "RAWINTs - RApid Skin Wound healing by INtegratedTissue engineering and Sensing". © NATO

Thus SPS activities support NATO's efforts to strengthen international and regional security by projecting stability and helping Partner countries build capacity. While doing so, they contribute to the Alliance's Strategic Objectives as set out in the 2010 Strategic Concept, in the NATO Partnership Policy adopted in Berlin in 2011, and in high-level political meetings including Ministerials and Summits. The overarching guidance approved by the North Atlantic Council is the key document for the alignment of the Programme with NATO's Strategic Objectives.

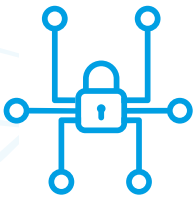
WHAT IS SPS?

Today, through a balanced 360° approach, SPS promotes practical cooperation based on four core dimensions that define its identity:



Science:
the SPS Programme helps to foster research, innovation, applied science and technology, as well as knowledge exchange in an effort to address mutual security challenges. As a brand, SPS has a wide network, reaching hundreds of universities and institutions across Allied nations and Partner countries, and supporting many young scientists.

Partnership:
the collaborative framework of the Programme brings together scientists, experts, and policy makers from Allied and Partner countries to address today's security challenges. SPS is well known as one of the most important Partnership programmes that is available to all Partners, proving that practical cooperation is achievable across political barriers through scientific exchange.



Security:
according to the scope of the SPS Programme and guidance from NATO nations, all projects developed under SPS must have a security dimension. This is also reflected in the SPS key priorities developed by Allies.

Other security related activities:

The SPS Programme's primary purpose is to strengthen NATO's Partnership policy. Following a comprehensive Strategic Assessment of the SPS Programme in 2013, it has grown to include projects related to capacity building, hybrid warfare and Women Peace and Security (UNSCR 1325), while preserving the important scientific dimension of the Programme.

WHOM DOES IT BENEFIT?

The SPS Programme links civil society to NATO through activities that address global security challenges. Civil actors, including researchers, academics, and government experts play important roles in helping the Alliance identify, understand, and respond to contemporary vulnerabilities and threats.

HOW DOES IT WORK?

The SPS Programme provides funding and expert advice for security-relevant activities in the form of Multi-Year Projects (MYP), Advanced Research Workshops (ARW), Advanced Training Courses (ATC), and Advanced Study Institutes (ASI) involving at least one expert from a NATO Ally and one expert from a NATO Partner country and addressing at least one of the SPS key priorities.

Multi-Year Projects (MYP):

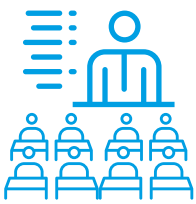
These are research and development projects related to NATO's Strategic Objectives and aligned with SPS key priorities. Projects involving more than one Partner country are encouraged, as is the participation of young scientists. The projects enable Partner country scientists to increase contacts within the NATO scientific community, while building a stronger scientific infrastructure in their home countries. Projects have an average duration of 2-3 years.

Advanced Study Institute (ASI):

Advanced Study Institutes (ASI) are high-level tutorial courses on the latest developments in SPS key priority areas for an advanced-level audience. An ASI lasts around seven working days. Lecturers of international standing report on new advances on topics of security-related civil science to pre- and post-doctoral level scientists with a relevant background in the subject matter. In particular, young scientists from NATO Partner countries are encouraged to participate.

Advanced Training Course (ATC):

Specialists share their security-related expertise in one of the SPS key priority areas. An ATC is not intended to be lecture-driven, but interactive. The course contributes to



the training of experts in Partner countries and enables the formation and strengthening of international expert networks. The tailor-made modular courses respond to the needs of Partner nations. Trainees are chosen on the basis of their qualifications and experience and the benefit they may draw from the ATC in their future activities. ATCs may last between 5-7 working days.

Advanced Research Workshop (ARW):

Advanced Research Workshops are expert workshops that provide an open platform for experts and scientists to share their experience and knowledge in order to promote spin-off activities such as research projects. ARWs may last between 2-5 days, gather up to 50 participants, and are preferably held in the participating Partner country.

The Independent Scientific Evaluation Group (ISEG)

The ISEG is a group of 38 scientists and experts from Allied countries who are appointed by the Partnerships and Cooperative Security Committee (PCSC). The main role of the ISEG is to evaluate the scientific and technical value of all applications through peer-review. In addition, ISEG members follow and evaluate ongoing SPS projects in their areas of expertise to ensure that all activities meet the SPS criteria for success, are well managed, and reach the end of their lifecycle with concrete deliverables.

ISEG members are also critical in designing and supporting SPS Special Calls for Proposals, including the Special Call for activities on Counter-Terrorism that closed in February 2018. ISEG members help to identify focus areas of future research in this field, and take part in the thorough evaluation of applications received in response to Special Calls. The direct involvement of these members of the scientific community is invaluable in maintaining the integrity and high scientific standard of the SPS Programme.

In 2018, two meetings of the ISEG were held in Brussels. The first took place from 27-28 February, and the second from 3-4 October. During the meetings, invited applicants presented their project proposals to the ISEG. ISEG members also shared updates and synopses on the implementation of SPS activities that they had attended as evaluators.

ISEG meeting in Brussels, February 2018. © NATO

SPS Key Priorities

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 for 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 regarding the protection against, diagnosing effects, detection, decontamination, destruction, disposal and containment of CBRN agents;
- Risk management and recovery strategies and technologies;
- Medical countermeasures.

e. ENVIRONMENTAL SECURITY

- Security issues arising from key environmental and resource constraints, including health risks, climate change, 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;
- 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 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 practice.

c. MINE & UNEXPLODED ORDNANCE (UXO) DETECTION & CLEARANCE

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

d. HUMAN & 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.

CHAPTER 2

A Summit Year

NATO Summit meetings provide periodic opportunities for Allied Heads of State and Government to evaluate and provide strategic direction for Alliance activities. They are often held at key moments in the Alliance's evolution to introduce new policy, invite new members into the Alliance, launch major initiatives and reinforce Partnerships. The 2018 Brussels Summit was no exception. For the SPS community, it was an opportunity to refine its political priorities in specific directions, from projecting stability to supporting the development of advanced technologies with a 360° approach to include all Partners.

Heads of State and Government agreed over one hundred measures, from boosting the Alliance's presence in the East and Southeast, to reinvigorating its Partnerships and cooperation with various countries and institutions to which SPS has made significant contributions over the years. In 2018, regional and institutional cooperation has been further strengthened by SPS contributions.

Refining political priorities

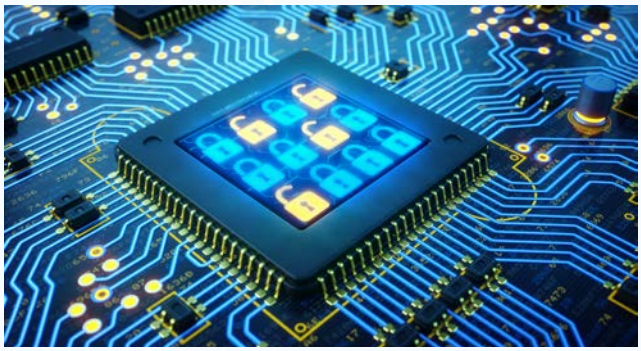
In line with the Summit Declaration, the SPS Programme's activities promote NATO's Strategic Objectives in five key areas: Projecting Stability with the Defence and Related Security Capacity Building (DCB) Initiative; cyber defence, hybrid challenges, and resilience; counter-terrorism; NATO-EU cooperation; and modernisation, particularly through advanced technologies.

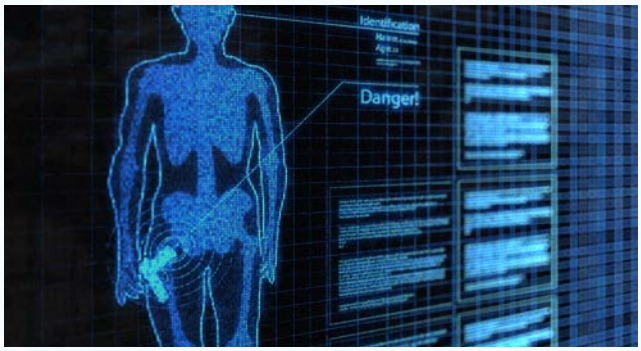
Projecting Stability by engaging Partners, from the Middle East and North Africa as well as from Eastern Europe and the Western Balkans in practical, regional cooperation has remained a high priority for the SPS Programme throughout 2018. This included the development of new capacity building initiatives with Partners, such as Tunisia and Iraq. Bilateral consultations were conducted with Morocco and Bosnia and Herzegovina to prioritise and explore the potential for future activities. Collaboration with Israel focused strongly on sharing experience and knowledge, as well as on advanced technologies research. In 2018, the SPS Programme welcomed the practical recommendations resulting from a study by the German Marshall Fund on the Future of NATO's Mediterranean Dialogue, which identified cooperation with the SPS Programme as one of six priorities for Partners in the South.

Throughout 2018, SPS activities have made concrete contributions to key NATO Partnership policies and priorities, including the **Defence and Related Security Capacity Building Initiative** in Tunisia, Jordan and the Republic of Moldova. The Tunisia DCB Package focuses on seven priority areas of cooperation, of which SPS will be leading three, namely CBRN defence, cyber defence and countering improvised explosive devices (C-IED). In the DCB Package for Jordan, the leading areas for support and cooperation within the SPS framework in 2018 included C-IED, cyber defence, and border security. Cyber defence remained the main priority in the DCB package for the Republic of Moldova in 2018.

Cyber attacks and hybrid methods of warfare, such as propaganda, deception, sabotage and other non-military tactics have long been used to destabilise adversaries. What is new about attacks seen in recent years is their speed, scale and intensity, facilitated by rapid technological change and global interconnectivity. These threats are major contemporary challenges to international peace and security. Throughout 2018, the SPS Programme has supported efforts to protect

Allies and Partners against attacks, to assist them in improving their resilience, and to develop cooperation to counter cyber and hybrid threats.





SPS supports research on detection technologies for explosives and firearms. © iStock

Terrorism continues to pose a direct threat to the security of the citizens of NATO and Partner countries, and to international stability and prosperity as a whole. SPS supports NATO's counter-terrorism (CT) agenda in four distinct categories: human factors; the development of detection technologies for explosives and other threats; methods for the protection of critical infrastructure, supplies and personnel; and risk management, best practices and technologies in response to terrorism. In 2018, SPS continued to support the implementation of the Action Plan on Enhancing NATO's role in the International Community's Fight against Terrorism through the development of tailored activities, notably a project on the real-time detection of explosives and firearms in mass transit environments, called "DEXTER" (Detection of EXplosives and firearms to counter TERrorism). In an effort to develop new capabilities and technologies to tackle terrorist threats and to manage the consequences of terrorist attacks, the SPS Programme issued a Special Call for Proposals on Counter Terrorism activities, which closed on 1 February 2018.

The SPS Programme regularly engages with the **European Union** (EU) in order to foster dialogue and cooperation. In 2018, practical cooperation with the EU contributed to the enhancement of international security through an alignment of efforts. In staff-to-staff talks, both NATO and the EU have emphasised a need for continued coordination and discussions, and have recognised the value of this exchange in order to enhance synergies and avoid duplication of work. In line with the EU-NATO Ministerial Declaration of July 2016, NATO and EU staff exchanged information on several occasions on SPS activities with select Partner countries, namely Bosnia and Herzegovina, the Republic of Moldova, and Tunisia. One important example of cooperation with the EU is the ongoing Multi-Year Project "Resilient Civilians in Hybrid and Population-Centric Warfare", which was launched in May 2018. The project involves a large number of stakeholders, including the European Centre of Excellence (CoE) for Countering Hybrid Threats, established by the EU with NATO support.

When it comes to **modernisation and innovation**, the SPS Programme has demonstrated its ability to adapt to NATO's changing strategic and security agenda, and it continues to support key Allied Partnership priorities and policies today. With 123 ongoing activities, the SPS Programme maintains its central role in engaging Allies and Partner countries in meaningful, practical cooperation on security-related civil science and innovation. Modernisation is paramount to the Programme's ability to continue making important contributions to the security-related civil-science field, while further developing and deepening NATO's Partnerships, meeting the interests of both Allies and Partners.

Reaffirming regional and institutional cooperation

SPS supports collaboration between scientists, experts and officials from Allied and Partner countries through established Partnership Frameworks, including the Euro-Atlantic Partnership Council (EAPC); the Mediterranean Dialogue (MD); the NATO-Ukraine Commission (NUC), and its subordinated Joint Working Group on Scientific and Environmental Cooperation; the Istanbul Cooperation Initiative (ICI); and Partners across the Globe (PaG). SPS activities take into account priorities and preferences of Partners, specifically those outlined in approved Partnership documents, including Individual Partnership Action Plans (IPAPs), Individual Partnership Cooperation Programmes (IPCPs) and Membership Action Plans (MAPs).

South

In 2018, the SPS Programme continued to foster regional cooperation on security-related issues, thereby encouraging cooperation among Partners, particularly through the MD and the ICI. These activities were developed to have tangible impact, build capacity and be complementary to NATO's wider Partnership efforts. Throughout 2018, the SPS Programme has maintained a high level of engagement with southern Partners and launched a number of new activities aimed at projecting stability and building capacity in the region.

High-level discussions on potential SPS projects on telemedicine and civil emergencies response with a Mauritanian delegation led by Health Minister Boubakar Kane. © NATO

NATO security is closely linked to security and stability in the South. Therefore, the MD and ICI have acted as integral components of the Alliance's policy of outreach and cooperation for many years. The SPS Programme has provided a platform for MD and ICI Partners to enhance research with Allies in the field of security-related civil science and technology.

An important element of these Partnership Frameworks is the establishment of new networks between researchers and practitioners whose work intersects in the fields of technological developments, security and defence. Practical scientific cooperation has successfully built stronger bridges and greater trust between Allies and southern Partners.

SPS ATC on Critical Energy Infrastructure Protection held at the NATO-ICI Regional Centre, February 2018. © NATO

The SPS Programme will continue to adapt its scientific research and technology development agenda to contribute to regional security and stability in the South, and to achieve better mutual understanding.

Kick-off meeting for the project on strengthening Cyber Defence capabilities in the Republic of Moldova. © NATO

SPS team presenting NICS to NATO Secretary General Stoltenberg and Serbian President Vucic during the EADRCC exercise "Srbija 2018". © NATO

East

The Comprehensive Assistance Package (CAP) for Ukraine was endorsed by Heads of State and Government at the Warsaw Summit in July 2016. Throughout 2018, the SPS Programme continued to implement flagship projects highlighted in the Summit deliverables. Ukraine remains the SPS Programme's largest beneficiary. Activities conducted with Ukraine reflect priority areas of cooperation identified and discussed at regular meetings of the NATO-Ukraine Joint Working Group on Scientific and Environmental Cooperation. These include cyber defence, materials research, critical infrastructure protection, and Women, Peace and Security (UNSCR 1325). In 2018, SPS activities continued to seek to support scientists and researchers who have been internally displaced as a result of the conflict in Ukraine.

As part of NATO's DCB Package for the Republic of Moldova, the SPS Programme actively supported the build-up of Moldovan Cyber Defence capabilities, and completed the development of a National Action Plan for the implementation of UNSCR 1325 on Women, Peace and Security.

In the Western Balkans, the SPS Programme continued to promote regional cooperation by engaging researchers and experts in cross-border activities. One prominent example is the Next-Generation Incident Command System (NICS), which facilitates communication between first responders in emergency situations.

Global

With a view towards ensuring a balanced 360° approach to its cooperation with Partners, the SPS Programme further enhanced its outreach to Partners across the Globe (PaG) in 2018, by developing the first practical cooperative activity with NATO's newest Partner country, Colombia. Meanwhile, Korean experts are involved in the "Microwave Imaging Curtain" MYP, conducted under the umbrella of the DEXTER initiative. The first SPS workshop on cyber defence was organised in Japan in 2018. The event brought together key international experts in strategic and technical cyber defence to discuss issues of cyber stability in the region, contributing to mutual understanding, exchange of ideas and future collaboration in this area.

In the field of Women, Peace and Security, Japanese and Norwegian specialists collaborated on an ARW, which focused on creating a leadership development programme for the implementation of UNSCR 1325. Australia was involved in a smart energy activity, aimed at measuring energy production and consumption in deployable military camps.

SPS ARW on Cyber Defence in Tokyo, Japan, April 2018. © NATO

Working with international and NATO bodies

The SPS Programme regularly engages with other international organisations (IOs), NATO bodies and agencies in order to foster dialogue and cooperation. In 2018, practical cooperation with the United Nations (UN), the Organisation for Security and Cooperation in Europe (OSCE), and the EU enhanced international security through an alignment of efforts. In regular staff-to-staff talks, all IOs emphasised a need for continued coordination, and recognised the value of communication in order to enhance synergies and avoid duplication of work.

SPS cooperation with the UN and its related Agencies continued throughout 2018. Two ARWs on the protection of civilians in peacekeeping operations were organised within the framework of the SPS Programme. An ARW focused on Armed Groups, Civilian Protection and United Nations Peacekeeping took place in November 2018. The second one is scheduled for 2019. It will focus on the protection of persons with disabilities in armed conflict, supporting ongoing efforts within the international community to bring International Humanitarian Law in closer alignment with the UN Convention on the Rights of Persons with Disabilities.

In May 2017, NATO Heads of State and Government agreed to enhance NATO's contribution to the international community's fight against terrorism. NATO's engagement with the African Union (AU) was subsequently reinforced over the course of 2018. Building upon previously established collaboration with the African Union's Commission's ACSRT (African Centre for the Research and Study of Terrorism) and with the AU's Special Representative for Counter-Terrorism Cooperation, an ATC has been developed throughout 2018, aimed at supporting the AU's Counter-Terrorism capacity and institutional development through training and education. The joint ATC will be held in April 2019 in Algeria and is led by the NATO CoE for Defence Against Terrorism in cooperation with the ACSRT.

In line with the EU-NATO Ministerial Declaration of July 2016, NATO and EU staff exchanged information on several occasions on SPS activities with selected Partner countries, namely Bosnia and Herzegovina, the Republic of Moldova and Tunisia.

Coordination and cooperation with other NATO bodies, agencies, divisions and delegations is of vital importance for the successful implementation of the SPS Programme. In 2018, the Programme has continued to develop a fruitful cooperation with the Science and Technology Organisation (STO) and the office of the Chief Scientist. The cooperation is comprised of regular programmatic coordination, such as the inclusion of two STO representatives in the Independent Scientific Evaluation Group (ISEG), as well as practical cooperation on concrete SPS activities on a case-by-case basis. Furthermore, the SPS Programme has consulted with other NATO Divisions and Offices throughout the year (e.g. the Office of the NATO Secretary General's Special Representative on Women, Peace and Security) notably in preparation for new SPS top-down activities. Beyond Headquarters, the SPS Programme has continued coordinating with NATO agencies such as the NATO Support and Procurement Agency (NSPA) and the NATO Communication and Information Agency (NCIA), as well as with the NATO School in Oberammergau, Germany to develop key top-down flagship SPS projects on a case-by-case basis.

Finally, in 2018, the SPS Programme continued to draw on the expertise of NATO-accredited Centres of Excellence (CoE) such as the NATO CoE for Defence Against Terrorism based in Turkey; for Counter-Improvised Explosive Devices in Spain; for Energy Security in Lithuania; for Crisis Management and Disaster Response in Bulgaria; for Joint Chemical, Biological, Radiological and Nuclear Defence in the Czech Republic. SPS activities also engaged, among others, the NATO Maritime Interdiction Operational Training Centre (NMIOTC) in Greece, the Centre for Maritime Research and Experimentation (CMRE) in Italy, and the NATO-ICI Regional Centre in Kuwait.

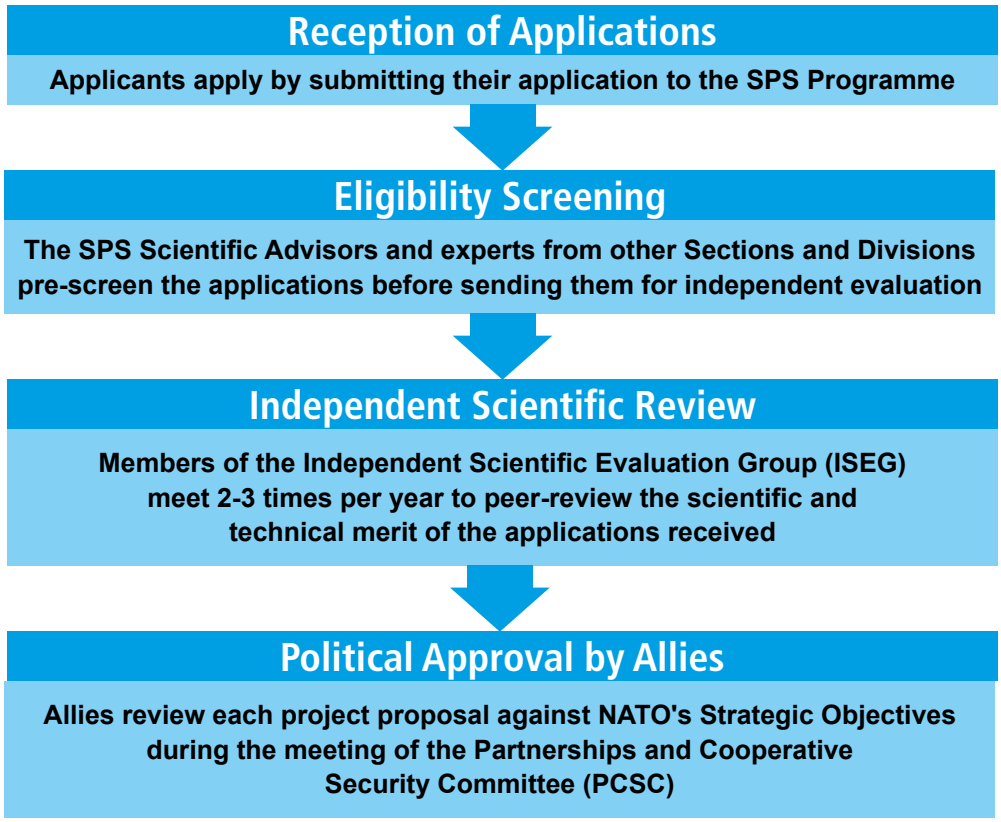
ARW on counter-trafficking of Weapons of Mass Destruction and CBRN material in maritime environments hosted by the NATO Maritime Interdiction Operational Training Centre in Greece. © NATO

CHAPTER 3

Facts and Figures

SPS Applications reviewed in 2018

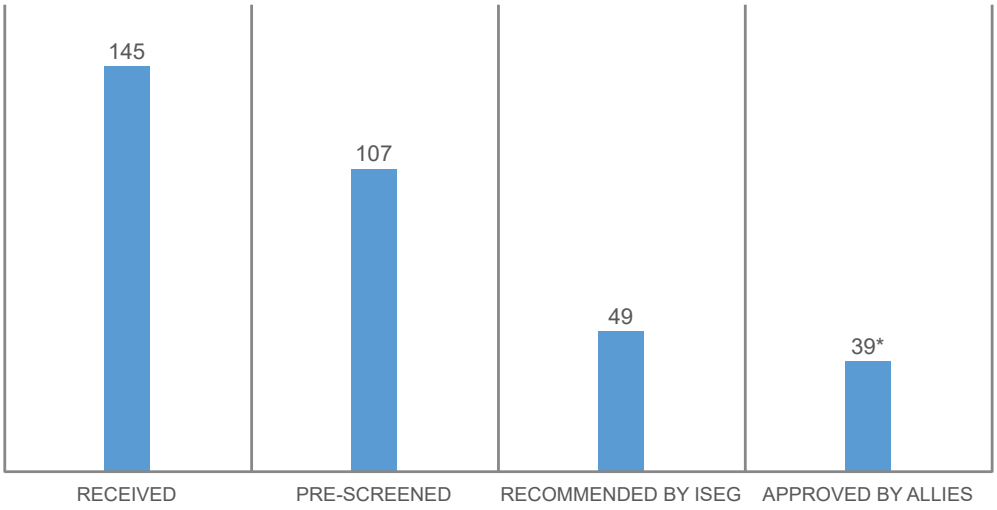
In 2018, the SPS Programme received a total of 145 applications in response to three submission deadlines and two special calls for applications in the fields of cyber defence and counter-terrorism. NATO experts performed an initial screening to evaluate the eligibility of proposals, taking into account their relevance to NATO, the link to SPS key priority areas, the Partnership value of the activities and the specifications of the budget. Following this initial screening, members of the Independent Scientific Evaluation Group were presented with 107 eligible applications for electronic peer-review and further discussion at meetings in February and October 2018 in Brussels. The ISEG recommended a total of 49 SPS proposals. The NATO Partnerships and Cooperative Security Committee approved a total of 40 SPS award recommendations, which comprised 39 activities recommended by the ISEG in 2018, and one proposal pending from the 2017 review cycle. The remaining 10 applications recommended by ISEG in late 2018 will be considered by Allies in 2019. The chart below provides an overview of the application process. A complete list of SPS activities approved in 2018 can be found in Annex 1.



In 2018, one third of the applications recommended by the ISEG were top-down activities. The following chart provides a detailed breakdown regarding the distribution of top-down versus bottom-up proposals.

	SPS Applications received in 2018	Top-Down	Bottom-Up	Total
Eligibility Screening	Applications Received	28	117	145
	Ineligible Applications	1	31	32
	Applications withdrawn by applicants	0	6	6
Independent Review	Reviewed by ISEG	27	80	107
	Recommended by ISEG	17	32	49
Political Review	Approved by PCSC in 2018	14	25	39*
	Applications pending final decision	3	7	10

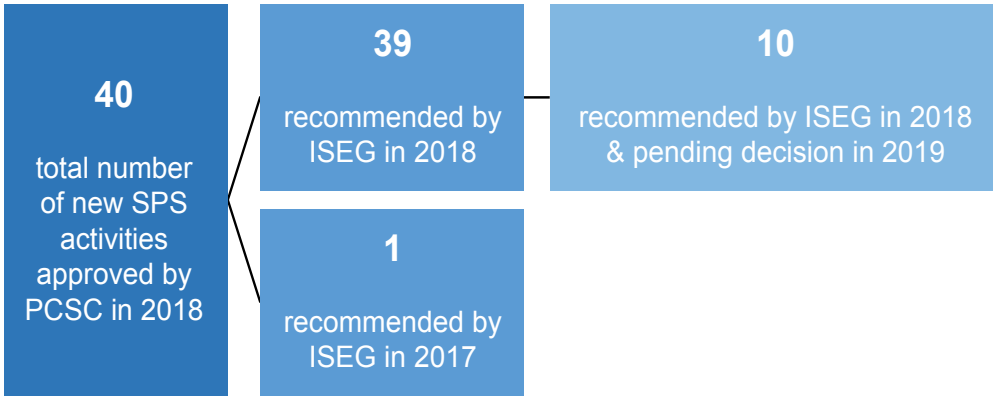
Award cycle of applications received in 2018



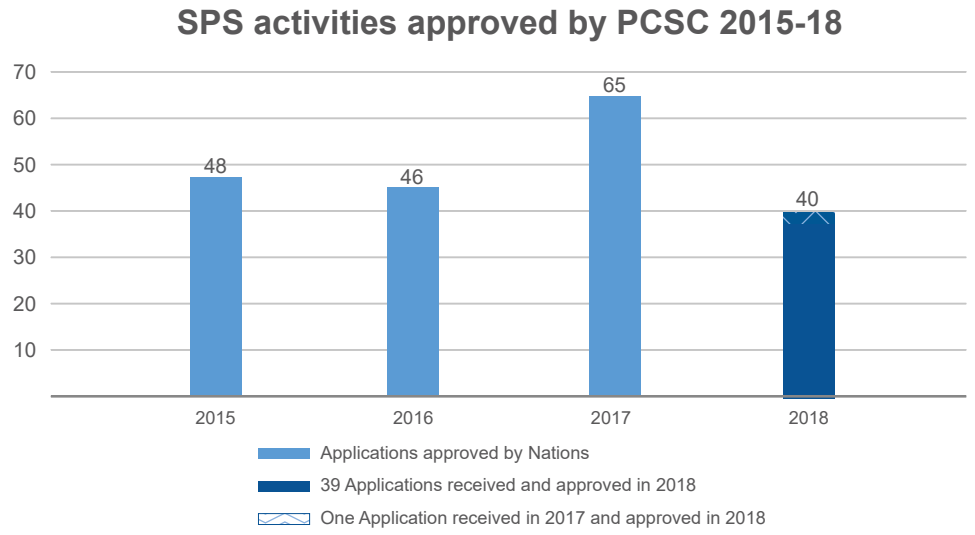
** In the course of 2018, the PCSC reviewed and approved 39 applications received during the 2018 round of applications and one application received the previous year.*

Activities Approved by the PCSC in 2018

In 2018, Allies reviewed and approved a total of 40 activity proposals. These included 39 applications recommended by the ISEG in 2018 and one proposal recommended by ISEG in 2017. 10 applications recommended by ISEG in late 2018 will be considered by Allies in 2019.



The chart below provides an overview of the applications approved for funding over the last four years.



New activities by Grant Mechanism

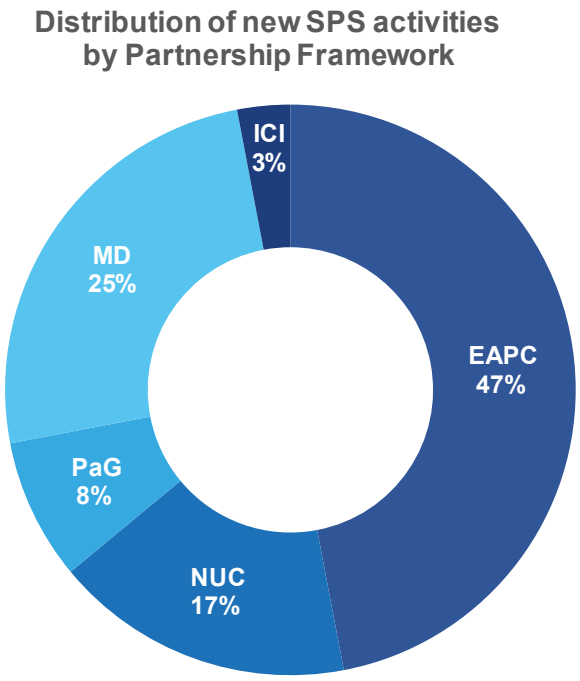
The SPS Programme supports collaboration with Partners through several established grant mechanisms, namely MYPs, ARWs, ATCs and ASIs. The chart below provides the breakdown of new activities over the 2018 calendar year according to **SPS grant mechanisms**.

Mechanism		Top-Down	Bottom-Up	Total
MYP	Multi-Year Project	7	15	22
ARW	Advanced Research Workshop	3	9	12
ATC	Advanced Training Course	5	1	6
ASI	Advanced Study Institute	0	0	0
	Total			**40**

New activities by Partnership Framework

In 2018, the SPS Programme initiated 40 new activities involving 22 different Partner countries. The chart below provides a breakdown of activities approved in 2018 according to **Partnership Frameworks**.

Partnership Framework		Top-Down	Bottom-Up	Total
EAPC	Euro-Atlantic Partnership Council	7	12	19
NUC	NATO-Ukraine Commission	1	6	7
PaG	Partners across the Globe	0	3	3
MD	Mediterranean Dialogue	7	3	10
ICI	Istanbul Cooperation Initiative	0	1	1
	Total			**40**



New SPS activities engaged Partners from all NATO Partnership Frameworks, reflecting the 360° approach of the Alliance. A large number of the new activities (47%) were developed within the framework of the Euro-Atlantic Partnership Council (EAPC), involving Partners from Eastern and Western Europe, the Balkans and Central Asia. Though new activities with Ukraine declined from 24% of total approved activities in 2017 to 17% in 2018, the SPS Programme continued to implement flagship projects and complete the SPS deliverables identified in the Comprehensive Assistance Package for Ukraine. New activities initiated under the NATO Ukraine Commission (NUC) aligned with priority areas of cooperation identified and discussed at the 15th meeting of the NATO-Ukraine Joint Working Group on Scientific and Environmental Cooperation that took place in Kyiv in July 2017.

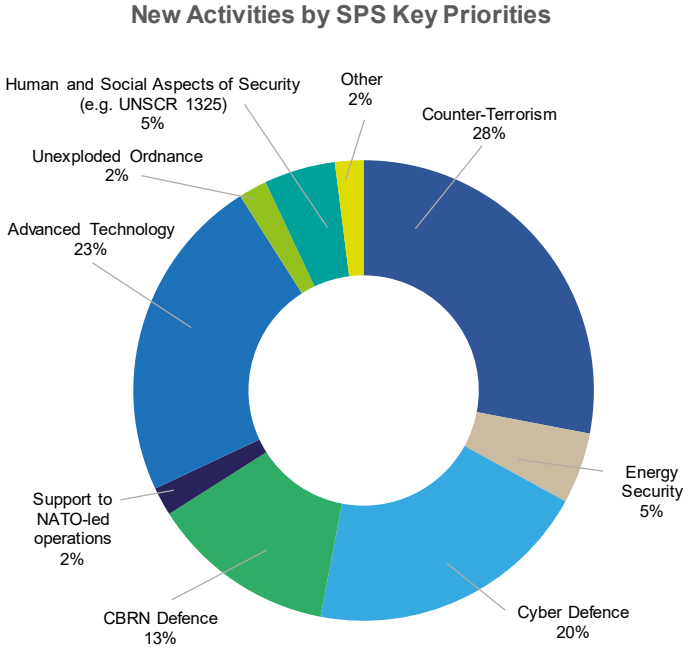
In comparison to 2017 figures, the proportion of activities involving Mediterranean Dialogue countries increased from 20% to 25%, whereas the number of activities led by Istanbul Cooperation Initiative countries decreased from 8% to 3%. Three new activities (8%) with Partners across the Globe were also initiated in 2018, one of which was the first SPS activity with a new NATO Partner, Colombia.

New activities by SPS key priority

The SPS Programme is embedded in the Emerging Security Challenges Division (ESCD), which addresses new security challenges in a comprehensive and cross-cutting way, serving as NATO's hub of expertise on a growing range of non-traditional risks and challenges. Its priorities are: Counter-Terrorism, Cyber-Defence, Energy Security, and Hybrid Warfare. The focus of the SPS Programme spans across these new security challenges and it strives to bring together scientists, experts, and policy makers from NATO and Partner countries to tackle them through scientific cooperation.

	SPS Key Priority	Top-Down	Bottom-Up	Total
1a.	Counter-Terrorism	3	8	**11**
1b.	Energy Security	2	0	**2**
1c.	Cyber Defence	1	7	**8**
1d.	Defence against CBRN Agents	3	2	**5**
1e.	Environmental Security	0	0	**0**
2.	Support for NATO-led Operations	0	1	**1**
3a.	Advanced Technology	2	7	**9**
3b.	Border and Port Security	0	0	**0**
3c.	Mine and Unexploded Ordnance Detection and Clearance	1	0	**1**
3d.	Human and Social Aspects of Security	2	0	**2**
4.	Other Security Threats Related to NATO's Strategic Objectives	1	0	**1**
	Total	**15**	**25**	**40**

Of the 40 newly initiated SPS activities in 2018, the most active area of cooperation was Counter-Terrorism at 28%, reflecting the SPS support to the Action Plan on Enhancing NATO's role in the International Community's Fight against Terrorism, endorsed by Allies in May 2017. It was followed by Advanced Technologies, representing 23% of the newly approved activities, Cyber Defence at 20%, and CBRN Defence at 13%. The table above and the chart below provide more information on how the 40 new SPS activities addressed the various **key priorities**.



CHAPTER 4

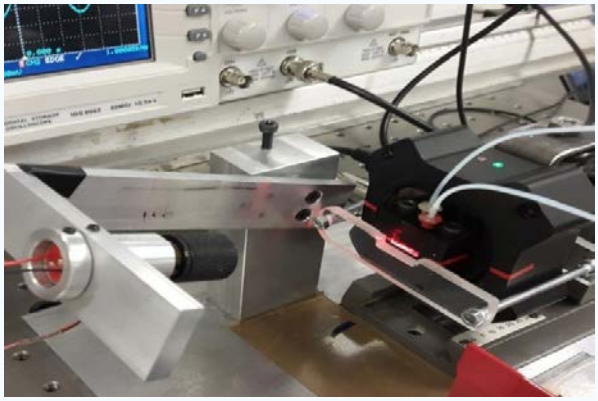
Flagship Activities

CBRN Defence

In line with NATO's political agenda, the central objective of SPS activities under the key priority of defence against chemical, biological, radioactive and nuclear agents is to improve the ability of NATO and Partner countries to protect their populations and civilian and military personnel from CBRN threats. In 2018, SPS activities continued to deliver high-quality scientific research, capacity building, and training of young researchers in the area of CBRN defence, strengthening the overall resilience and capabilities of participating countries.

Detecting bio-toxins with sensors [completed]

Countries involved: Hungary, Ukraine, and France, United Kingdom, Israel



Planar Polarization Interferometer for the detection of bio-toxins. © NATO

In 2018 the SPS MYP "**Development of Optical Bio-Sensor for detection of Bio-toxins**" was successfully completed.

The project enabled authorities to significantly improve food and health security by developing nano-structured films for biosensing applications, as well as a portable device for the detection of bio-toxins.

Responding to radiological or nuclear emergencies [completed]

Countries involved: Italy, Egypt

The MYP "**A Panel of Biomarkers as a Novel Tool for Early Detection of Radiation Exposure**" was approaching completion towards the end of 2018. In CBRN incidents, swift and targeted intervention by medics can be crucial to saving lives. Italian and Egyptian scientists cooperated on the development of a novel, fast, accurate and user-friendly tool to measure the absorbed dose of toxic substances after a radiological or nuclear emergency. This tool will enable first responders to focus medical resources on subjects in critical need of medical countermeasures and treatments, in order to avoid overwhelming the medical facilities and personnel.

Internal training session at the High Institute of Public Health, Alexandria University, Egypt. © NATO

First responders training in the NATO-ICI Regional Centre [completed]

Countries involved: Czech Republic, Kuwait

In March 2018, a "**CBRN First Responders Training Course**" took place at the NATO-ICI regional Centre in Kuwait, with the goal of ensuring that first responders have a common knowledge base and a minimum level of preparedness when responding to CBRN incidents.This SPS activity helped to improve national civil emergency plans, complement national training systems, and build interoperability among first responders of NATO and ICI countries. The course was delivered by the Joint CBRN Defence Centre of Excellence.

CBRN First Responders Training Course at NATO-ICI Regional Centre in Kuwait. © NATO

Improved stabilisation of hazardous wastes in Serbia [new]

Countries involved: United Kingdom, Serbia

In 2018, the MYP "**Improved Security through Safer Cementation of Hazardous Wastes**" was launched by experts from the United Kingdom and Serbia. This project aims at improving the security of societies by removing chemical and radiological hazards in waste materials. The project directors will employ a new method that will contribute to improved solidification and stabilisation of hazardous wastes, thereby decreasing their negative environmental impact.

SPS visit to the newly launched project on stabilisation of hazardous wastes in Serbia. © NATO

Counter-Terrorism

Terrorism is a persistent global threat that knows no border or nationality. SPS has been supporting NATO's counter-terrorism (CT) agenda in four distinct categories: human factors against terrorism; development of detection technologies for explosives and other threats; methods for the protection of critical infrastructure, supplies and personnel; and finally, risk management, best practices and technologies in response to terrorism.

MYPs focused mainly on the development of technologies for the detection of explosives and firearms, while SPS events addressed a broader spectrum of topics, including training courses to enhance Partners' resilience, risk management and the protection of critical infrastructures.

Detecting explosives and firearms in mass transit environments [new]

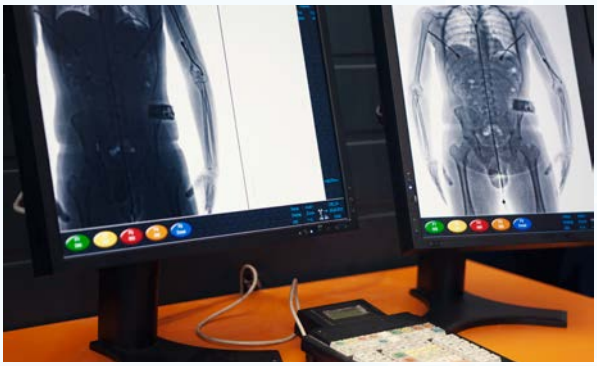
Countries involved: France, Germany, Italy, Netherlands, Finland, Serbia, Republic of Korea, Ukraine

In 2018, the first elements of **DEXTER (Detection of EXplosives and firearms to counter TERrorism)** were launched within the SPS Programme. DEXTER is a multinational, key flagship, 'top-down' programme, run by a consortium of laboratories and research institutes, aimed at developing an integrated system that can detect explosives and firearms in public spaces, remotely and in real time, without disrupting the flow of pedestrians. The system will be live-tested in a metro station in Rome in 2021.

Development of sensors for proximal trace detection of explosives and firearms. © NATO

Under the DEXTER umbrella, three projects were launched in 2018. The year started with the kick-off event of the first project, named "**Microwave Imaging Curtain**", led by France and Ukraine, and supported by Korean experts, with the goal of demonstrating the performance of an affordable solution to the challenge of detecting concealed firearms and explosives. It was followed by the "**Explosive Trace Detection for Standex (EXTRAS)**" project, led by Italy and Serbia and involving Ukraine, Netherlands and Germany. EXTRAS will contribute to the development of a stand-off sensor to monitor explosives trace components, building upon technology already developed within STANDEX. EXTRAS equipment will be used in combination with the 'Microwave Imaging Curtain' as an additional sensor, enabling two independent detection technologies to work simultaneously.

EXTRAS will be complemented by the MYP "**Integrated System for Threats EArly Detection (INSTEAD)**" launched in 2018. Led by Italy and Finland, INSTEAD is designed to interface with the aforementioned projects, delivering a system for centralised management of a plurality of sensors deployed on a specific location for improving the detection capabilities of person-borne explosives in moving crowds.



Example of system for the centralised management of explosive detection sensors.

In an endeavour to develop new capabilities and technologies to tackle terrorist threats and to manage the consequences of terrorist attacks, the SPS Programme issued a Special Call for Proposals on Counter Terrorism activities, which closed on 1 February 2018. This Special Call resulted in four new activities, two of which were launched in November 2018. These two top-down research projects are jointly funded by the Science and Technology Directorate of the US Department of Homeland Security.

Establishing evaluation frameworks for CVE initiatives [new]

Countries involved: United States, Sweden

The Harvard University T.H. Chan School of Public Health and the Swedish Civil Contingencies Agency are leading the MYP "**Evaluation support for countering violent extremism (CVE)**". The aim is to create long-term capacities for the evaluation of initiatives to counter violent extremism, thus improving the effectiveness, transparency and accountability of such programmes. The project team will collaborate with experts from NATO member and Partner countries in the design and implementation of programme evaluations that meet local requirements, improve evaluation procedures and provide practical tools and methods.

Countering Unmanned Aerial Vehicles [new]

Countries involved: United States, Switzerland

Joint kick-off meeting for the CVE and C-UAS MYPs at NATO HQ in November 2018. © NATO

With the MYP "**Mobile Adaptive/Reactive Counter-Unmanned Aerial System (MARCUS)**", the SPS Programme addresses the potential threats posed by drones by supporting the development of technology to counter unmanned aerial systems. It tackles the risks posed to national security by low, slow and small weaponry. Sandia National Laboratories will lead the research in collaboration with the University of New Mexico and the Swiss Federal Department of Defence, Civil Protection and Sport, armasuisse.

NATO's enhanced CT contributions to the international community's fight against terrorism offered opportunities for cooperation with new Partners in 2018, exploring the nexus between counter-terrorism, counter-narcotics and counter-piracy.

First SPS activity with Colombia: protecting critical maritime infrastructure [new]

Countries involved: Denmark, Colombia

'Counter-Terrorism Lessons from Maritime Piracy and Narcotic Interdiction' is the first activity developed with new NATO Partner country Colombia. It is a three-day ARW, which was approved by Allies in 2018 and will take place in Copenhagen in the first half of 2019. It will gather thirty policymakers, practitioners, and academics from fifteen Allies and two Partner nations to engage in high-level discussions focusing on methods for protecting critical maritime infrastructure, such as ports, supplies, and personnel from terrorist attacks.

Counter-Improvised Explosive Devices

Mines, unexploded ordnances (UXOs), improvised explosive devices (IEDs) and other explosive remnants of war pose threats to civilians and militaries alike, particularly in war-torn countries. International cooperation is crucial to effectively address this challenge. The SPS Programme supports the development of new capabilities and technologies to tackle the significant threat posed by mines, UXOs and IEDs, and to manage the consequences of their proliferation. In line with the 2018 Brussels Summit Declaration, SPS continued to sustain projects that address human, scientific and technological advancements in the field of Mine and Unexploded Ordnance Detection and Clearance by fostering collaborative networks between academia, think tanks, civil society and government representatives throughout 2018.

© NATO

Deploying robotic platforms for landmine and IED detection [completed]

Countries involved: Italy, Ukraine, and United States

The MYP "**Holographic and Impulse Subsurface Radar for Landmine and IED Detection**" was successfully completed in October 2018. Scientists from Italy and Ukraine, in collaboration with experts from the USA, demonstrated the advantages of sensors integration on a remotely controlled robotic platform, effectively increasing the safety of the operator and improving the classification of targets by combining the imaging provided by radar and optoelectronic sensors, such as cameras and scanners. The researchers involved also demonstrated the operability of the system in the field. This robotic platform will change the approach to detecting landmines in post-war zones while significantly reducing human-to-mine and animal-to-mine contact.

Prototype of the "U-GO 1st" robotic platform for landmine and IED detection displayed on the occasion of the 60th anniversary of SPS at NATO HQ. © NATO

Sharing insights on explosives detection [completed]

In October 2018, a "**Cluster Workshop on Explosives Detection**" took place in Florence, Italy. This cluster event, which was a recommendation of the International Board of Auditors for NATO (IBAN), gathered over 50 scientists and experts from 16 NATO and Partner countries. It was a great opportunity to assess how SPS projects in the field of explosives detection contribute to the development and refinement of scientific and technical knowledge. During the event, three technologies for the detection and clearance of IEDs, namely a semi-autonomous robot for detection of mines and IEDs, a lightweight and easy-to-use mine detector and a handheld detector for dirty bombs, developed in the framework of SPS MYPs, were successfully demonstrated.

Supporting NATO's Defence Capacity Building in Jordan [ongoing]

Countries involved: Spain, Jordan, and Ireland

2018 saw the successful implementation of the MYP "**Comprehensive Package for strengthening Jordanian C-IED defence capabilities**", developed within the framework of the Jordanian C-IED DCB package. The project provided a wide-ranging training package to support and assist in the development of the C-IED capabilities of the Jordanian defence and security forces. It also included a train-the-trainer programme, and backed the implementation of national interagency C-IED policies and programmes (IED Lexicon, Reporting, and Lessons Learned programmes). Altogether, 136 Jordanian military and law enforcement personnel participated in the different training events. The project was led by experts from the NATO C-IED CoE in Spain, together with experts from the Jordanian Armed Forces and the Irish Defence Forces Training Centre.

C-IED training in Jordan. © NATO

Developing lightweight autonomous sensors for UAVs [new]

Countries involved: Italy, Azerbaijan

The detection of explosives, particularly IEDs, is fundamental to the security of infrastructure such as airports and railway stations, but also along roads and inside buildings. In 2018, the MYP "**Portable Sensors for Unmanned Explosives Detection**" led by Italian and Azerbaijani directors was launched. This project aims to develop a completely autonomous and portable sensor weighing less than 500 grams to be carried by an UAV. The reduced weight will enable UAVs to explore dangerous sites without direct human intervention. In the future, this technology could also be used for the detection of IEDs in public spaces using a wireless sensor network.

Azerbaijani and Italian project team members meet to start working on the SPS MYP. © NATO

Advanced Technologies

SPS activities on security-related advanced technologies are unique opportunities to develop cutting-edge research that is mutually beneficial for both Allies and Partner nations. Activities under this key priority create significant added value in terms of scientific advancements and the development of disruptive technologies for dual-use civil-military applications. Activities also contribute to the creation of a vibrant scientific community, which shares common interests and substantial know-how. At a time of modernisation and with the increased importance of innovation at NATO, advanced technologies are becoming a significant SPS contribution to the overall effort within the Alliance.

Defence forces member wearing a motion based navigation system. © NATO

Enhancing military navigation systems in urban environments [new]

Countries involved: Norway, Finland

In 2018, Norwegian and Finnish scientists launched the SPS MYP "**Collaborative Augmented Navigation for Defence Objectives**". The experts aspire to design, develop and test an indoor-outdoor navigation system for blue force tracking in urban environments. The project builds on the concept of collaborative navigation, whereby members of a team operating in the same area are able to act as navigation references and communication nodes for the others. A number of scientific publications in international journals in the framework of the project are foreseen.

Improving detection of radioactive materials in cargo [new]

Countries involved: United States, Ukraine

"**Upgrade and improvements of the hand-held gamma detector based on High Pressure Xenon (HPXe) gas**" is a MYP that was launched in 2018 by the Stony Brook University of New York (USA) and the National Science Centre "Kharkov Institute of Physics and Technology" in Ukraine. HPXe technology can be used in security applications to detect whether radioactive materials surrounded by benign cargo are being transported in the normal stream of commerce. It aims to improve the detector design with the use of new technologies, and replace current detection systems that are heavy, bulky and extremely expensive. The ultimate end users of the detectors developed in this project will be security services in NATO and Partner countries, for homeland security and nuclear non-proliferation applications.

Detail of a chamber for purification and purity control developed by the project team. © NATO

First SPS project with Pakistan: Improving information transmission in emergencies [new]

Countries involved: Estonia, Pakistan, and Italy

SPS activities in the area of advanced technologies also support the development of tools and methods that can be applied in the fight against terrorism. One concrete example is the "**Public safety COmmUNication in ConTExt Related to TERROR attacks (COUNTER-TERROR)**" project, which was launched in 2018. It aims to develop technologies for the transmission of information from devices, such as smartphones, in emergency situations related to terrorist attacks. The timely availability of information is expected to reduce the response time and, consequently, save lives and protect critical infrastructure.

Complementing existing surveillance systems [ongoing]

Countries involved: Italy, Australia

Example of a high-altitude balloon radar. © NATO

The MYP "**High-Altitude Balloon-Borne Radar**", launched in 2017, proposes a new high-altitude balloon-borne synthetic aperture radar system. Such High Altitude Platforms (HAPs) complement aircraft and satellites in the gathering of surveillance data, and enjoy a number of unique advantages with respect to their alternatives. HAPs operate at altitudes exceeding 20km, they are less expensive than traditional satellite systems. Their comparatively low altitude, with respect to spacecrafts, makes them more versatile and recoverable, meaning that they can be easily maintained and even upgraded.

Securing Marine Infrastructures with Autonomous Platforms [ongoing]

Countries involved: Spain, Israel, and Canada

Underwater detection system based on a surface buoy. © NATO

Experts from Spain, Israel and Canada have been working on the MYP "**Autonomous Platform for Securing Marine Infrastructures**" since 2017. Researchers are developing a novel design for the autonomous detection of divers and submerged mines, employing a combination of active acoustic detection for the identification of scuba divers, and sonar target detection for the threat of submerged mines. The combination of the two systems will allow for the development of a quickly deployable and cost-effective system for the detection and localisation for underwater threats.

Environmental Protection, Energy Security & Smart Energy

Environmental Protection in a military context has been very important to NATO since the 1970s. The overarching Environmental Protection policy was first agreed by the Military Committee in 2003. This policy is supported by several standardisation agreements on topics such as waste management, best Environmental Protection practices for training areas, and quality requirements for the coating of naval vessels. The SPS Programme has always supported these activities - in coordination with Allied Command Operations, the NATO School in Oberammergau and other NATO bodies - to train experts from Allied and Partner nations and to advance technologies for improving the environment in military training areas.

Safeguarding human health and ecosystem integrity [completed]

Countries involved: United States, Ukraine

The ARW "**Environmental Health and Security in Ukrainian Conflict Zones**" was organised in Kiev in May 2018. The event gathered expert knowledge from academic leaders and policy makers in order to develop a plan to safeguard human health and the integrity of the ecosystem. Participants included experts from Allies, Partner countries and NATO, as well as delegates from the OSCE, EU, WHO, and various Ukrainian Ministries and institutions.

Environmental Health and Security in Ukrainian Conflict Zones Workshop. © NATO

Energy security related SPS activities facilitate cooperation among academia, industry, and the military with the aim to strengthen the resilience of critical energy infrastructure, to promote innovative energy technologies and to reduce the fuel consumption of NATO's Deployed Force Infrastructures, while strengthening operational effectiveness.

Protecting critical infrastructure in Georgia [completed]

Countries involved: Italy, Georgia, and United Kingdom, United States, Azerbaijan, Kazakhstan


Enguri Dam, Georgia. © NATO

2018 saw the successful completion of the MYP "**Security against Geohazards at the Major Enguri Hydroelectric Scheme in Georgia**". The project, which was launched in 2015, evaluated the vulnerability of the Enguri Dam, a critical infrastructure for Georgia's largest hydro electrical facility built in a geohazard-prone region.

The SPS experts assessed possible risk scenarios, developed potential preventive measures and suggested a comprehensive training programme. The end-users, including relevant ministries and civil protection agencies, received the results of the assessment and training that would allow them to adopt the proposed measures.

One SPS event and one MYP contributed to the NATO Smart Defence concept "**Smart Energy Training and Assessment Camp (SETAC)**", led by NATO/ESCD. Under SETAC, NATO is bringing together a growing community of experts to share information and best practices, and to advance the interoperability of equipment from various nations.

Promoting innovative civilian energy solutions in the military sphere [completed]

Countries involved: Lithuania, Georgia, and Germany

As part of NATO's Smart Energy Initiative, launched in 2011, the "**Innovative Energy Solutions for Military Applications (IESMA)**" conference has become a recognised platform, bringing together military, academia and industry, as well as civil servants. The fourth edition of IESMA was hosted by the NATO Energy Security CoE in Vilnius, Lithuania, in November 2018, and was organised in cooperation with the State Military Scientific Technical Centre "DELTA" of the Ministry of Defence of Georgia. IESMA 2018 focused on hybrid power generation and micro grids for dual use, using innovative civilian energy solutions in the military sphere.

Reducing energy consumption of deployable camps [new]

Countries involved: Canada (CanmetENERGY), Australia, and France, Germany, Netherlands, United States

Kick-off of the MYP Harmonised Energy Monitoring & Camp Simulation Tools for Energy Efficiency. © NATO

The MYP "**Harmonised Energy Monitoring & Camp Simulation Tools for Energy Efficiency**" kicked-off in Canada in September 2018. The project is developing universal energy monitoring kits that can be used or rebuilt by any nation that wants to assess their power generators, electrical consumers and energy storage devices. The harmonised data will be fed into a camp simulation software for better camp energy planning. The methodology and camp simulation will be proposed as a NATO standard, increasing interoperability, after testing and validation in multinational exercises and operations. The data gathered over the three-year project will empower camp planners to take informed decisions for reducing fuel consumption.

Cyber Defence and Hybrid Threats

SPS activities on the key priority of cyber defence provide opportunities for training, capacity building and technology development. Implemented activities support the construction of information technology infrastructure and improve defensive situational awareness.

In 2018, the SPS Programme discussed activities in support of the Defence Capacity Building (DCB) Package for Tunisia. Following an experts meetings at NATO Headquarters in November 2018, an Advanced Cyber Defence Course consisting of three main modules: Web Applications Security; Security Information and Event Management Systems (SIEM); and Log Analysis was developed. These modules will support Tunisia in developing its cyber defence capabilities, including the construction of information technology infrastructure and the integration of new technologies. The course will be led by experts from Turkey, the United States and Tunisia, and is scheduled to take place in 2019.

Defence Capacity Building in the Republic of Moldova: Cyber Defence Capabilities [ongoing]

Countries involved: Belgium, the Republic of Moldova, and Netherlands

The cyber defence project "**Development of the Moldovan Armed Forces Cyber Defence Capabilities**" was launched in 2017. The MYP aims at increasing human, technical, and procedural cyber capabilities in the Moldovan Armed Forces. It enhances the Forces' ability to face emerging and increasingly sophisticated cyber threats that may affect the military Computer Information Systems' functionality, security of services, and critical infrastructure. In the framework of the project, two cyber training courses were completed in 2018. The first covered various aspects of Cyber Defence, establishing a homogeneous knowledge base among the course attendees. The second course, '**Computer Security Incident Response Team**' focused on the skillset needed to respond to a cyber security incident. 2018 also saw the beginning of the construction of a cyber laboratory to support the Moldovan Armed Forces Cyber Incident Response Capability.

Launch of SPS MYP project to strengthen Cyber Defence capabilities in the Republic of Moldova, February 2018. © NATO

Securing the future of communications [new]

Countries involved: Slovakia, Malta, and Spain, United States

Quantum key is the sole technology able to guarantee a secure solution for cryptographic computerised communications. In this regard, reliable cryptographic solutions to protect the evolving information technology infrastructure remain vital. The MYP "**Secure Communication in the Quantum Era**" aims at developing complete solutions for authenticated group key agreements, which will enable groups of users to exchange information and collaborate securely over open networks in the post-quantum era. The project will contribute to an improvement of the long-term security of today's information technology infrastructure.

NATO-Ukraine Platform on Countering Hybrid Warfare: Building resilience through early warning [new]

Countries involved: Lithuania, Ukraine

In 2018, Allies approved the ARW "**Pooling Expertise to Develop an Early Warning System to Counter Hybrid Threats**" as part of the NATO-Ukraine Platform on Countering Hybrid Warfare. The project derived from the need to reconceptualise 21st century warfare in the face of Russia's war in Ukraine, and other challenges to post-Cold war European security infrastructure. In this regard, the event will bring together leading experts in this field to foster cooperation and partnerships, to develop new models of early warning, to counter hybrid threats and build resilience. The workshop will take place in April 2019.

In line with the EU-NATO Ministerial Declaration of July 2016, NATO and EU staff exchanged information on SPS activities with selected Partner countries, namely Bosnia and Herzegovina, the Republic of Moldova and Tunisia on several occasions.

NATO-EU cooperation: understanding civilian resilience [new]

Countries involved: Norway, Ukraine, and Denmark, France, United States, Finland

An important example of cooperation with the EU is the MYP "**Resilient Civilians in Hybrid and Population-Centric Warfare**", which was launched in May 2018. Among a large number of stakeholders, the project involves the European CoE for Countering Hybrid Threats, established by the EU with NATO support, and inaugurated in October 2017. This project will provide better understanding of how civilian resilience can help nations prevent and mitigate the consequences of hybrid threats.

Women, Peace and Security

The implementation of UNSCR 1325 on Women, Peace and Security (WPS) and related resolutions represents an important policy priority for NATO and Partner countries. The SPS Programme has been supporting the WPS agenda since 2013, with a total of 13 activities. By engaging strategic Partners on matters related to UNSCR 1325, SPS activities have made substantial contributions to key objectives of the WPS agenda and Partnership goals.

Discussions on the implementation of the Republic of Moldova's National Action Plan for the implementation of UNSCR1325. © NATO

Through its activities, the SPS Programme is providing an important platform for debate and exchange of views on lessons learned on the implementation of UNSCR 1325. Discussions have also included civil society and young researchers.

SPS activities supporting the WPS agenda were developed and implemented as part of key NATO Partnership initiatives such as the DCB initiative and NATO's wider efforts to project stability. SPS activities related to the WPS agenda are closely coordinated with the Office of the Secretary General's Special Representative on Women, Peace and Security and are in line with the NATO/EAPC Policy and Action Plan on Women, Peace and Security.

Advanced Research Workshops: Developing skills and sharing knowledge [completed]

Countries involved: Italy, Norway, Spain, Japan, Ukraine, United Arab Emirates

2018 saw the completion of several ARWs. For example, through collaboration between Japan and Norway, SPS provided a platform for leadership development and cooperation between civilian and military leaders within NATO and national defence structures on subjects such as gender equality, diversity, risk, peace and security.

Additional workshops focused on enhancing the role of women in international efforts to counter violent extremism, and the key role of women leaders and civil society organisations in enhancing civil-military cooperation in Ukraine.

SPS ARW on Advancing Women's role in International CVE Efforts, March 2018. © NATO

Defence Capacity Building in the Republic of Moldova: A National Action Plan [completed]

Countries involved: United States, the Republic of Moldova

This is a flagship project to support the development of a National Action Plan for the implementation of UNSCR 1325 in the Republic of Moldova as part of the country's DCB Package. UN Women contributed valuable expertise to this initiative, which was successfully completed with the adoption of the National Action Plan by the Moldovan government in March 2018.

Assessing gender equality in the Georgian Armed Forces [ongoing]

Countries involved: Slovenia, Georgia

In Georgia, the MYP "**WPS in the Georgian Armed Forces – Organisational Assessment**" is progressing. In February 2019, as part of this project, Levan Izoria, Minister of Defence of Georgia, and DASG/ESC Dr. Jamie Shea will open an international experts' workshop in Tbilisi, which will gather international specialists from Allied and Partner countries to support the Georgian Ministry of Defence in its institutional climate assessment.

International experts involved in an SPS MYP aiming to assess gender equality in the Georgian Armed Forces.
© Georgian Ministry of Defence

CHAPTER 5

Public Diplomacy and Visibility

The practical cooperation promoted by the SPS Programme holds significant public diplomacy value. It balances the primarily military perception of the Alliance and demonstrates the tangible impact and benefit of NATO Partnerships. As a result, SPS activities enjoy a high degree of visibility, both in NATO and Partner countries. Moreover, the Programme seeks to promote key projects, especially top-down flagship initiatives, with a visible, political and strategic impact.

Throughout 2018, the SPS Programme continued to make use of all public diplomacy tools at its disposal, and cooperated with the Public Diplomacy Division, NATO Contact Point Embassies and Liaison Offices, raising the visibility of SPS activities. The SPS Programme's main achievements and history in the contexts of its 60th anniversary featured prominently in the **Secretary General's Annual Report 2018**.

In addition, the SPS Programme conducted its own public diplomacy activities, specifically SPS Information Days organised in Hungary and Poland in 2018.

SPS Information Days

SPS Information Days are excellent opportunities to raise awareness about the SPS Programme and develop potential new activities by engaging with government representatives, scientists, and experts in NATO and Partner countries. Information Days are always highlighted on the SPS Twitter account, and in web stories on the SPS website.

Hungary

On 10 October 2018, an Information Day in Budapest, Hungary was organised in cooperation with the Hungarian Delegation to NATO, the National University of Public Service in Budapest and the Ministry of Foreign Affairs and Trade of Hungary. The event gathered around 100 participants and representatives from 20 Partner country embassies, providing an opportunity to raise awareness about the SPS Programme, and enabling participants to exchange views on future cooperation within the framework of the NATO SPS Programme. In attendance was Dr. Péter Sztáray, State Secretary for Security Policy at the Ministry of Foreign Affairs and Trade of Hungary, who underlined the added value for Hungarian scientists and experts to take part in SPS activities to improve regional security.

SPS Information Day in Hungary, October 2018. © NATO

Poland

Around 250 scientists, experts and policy makers from Allies and Partner countries, such as Finland, Ireland, Israel, the Republic of Moldova and Morocco gathered for the SPS Programme Information Day, on 22 November 2018, in Warsaw, Poland. The event was organised in cooperation with the Permanent Delegation of Poland to NATO, the Polish Ministry of Science and Higher Education, the Polish Ministry of Foreign Affairs and the Polish Ministry of Defence. High-level participants included

High-level participants at the SPS Information Day in Poland, November 2018. © NATO

Barosz Cichocki, Vice Minister of the Polish Ministry of Foreign Affairs and Dr. Piotr Dardziński, Secretary of State at the Polish Ministry of Science and Higher Education, both of whom expressed the desire to deepen practical cooperation by developing new SPS initiatives within the Alliance and with Partner countries.

SPS involvement in Srbija 2018 exercise

Around 2,000 personnel from 40 countries trained together in the large-scale emergency response exercise "*Srbija 2018*". This Euro-Atlantic Disaster Response Coordination Centre (EADRCC) exercise provided the opportunity to practice international cooperation and strengthen the ability of teams from different nations to work effectively together to save lives in an emergency. Two disaster relief tools, namely a multinational telemedicine facility and the Next-Generation Incident Command System, both developed in the framework of the NATO SPS Programme, were tested during the exercise.


SPS team at the "Srbija 2018" EADRCC exercise. © NATO

NATO SPS Website

The SPS website remains the main point of reference for up-to-date information and news related to the SPS Programme, as well as for all necessary information and forms for applicants and SPS grantees. Country flyers provide information on SPS cooperation with 40 Partner countries, including selected activities and Multi-Year Projects.

Twitter

In 2018, the SPS Programme continued to promote its activities on its social media channels, particularly through its Twitter account @NATO_SPS. Throughout the year, the SPS Twitter account witnessed a marked increase in followers, including scientists, subject matter experts, think tankers, and Delegations of NATO and Partner countries.

The SPS Twitter account provides updates on SPS activities as well as on public diplomacy events linked to the Programme, such as the SPS 60th Anniversary and SPS Information Days. Teams involved in ongoing SPS activities are also actively tweeting about their progress in workshops or research, on dedicated Twitter profiles.

Annex 1: New SPS Activities approved by PCSC in 2018

Key Priority	SPS Reference	Top-Down	Grant Mechanism	Title	NATO Country	Partner Country	Partnership Framework
Counter Terrorism (1.a.)	G5473		ARW	Post-ISIS Era: Regional and Global Implications	United States of America	Israel	MD
	G5526	×	MYP	Explosive Trace Detection for Standex (EXTRAS)	Italy	Serbia	EAPC-BLK
	G5524		ARW	Soft Target Protection	Slovakia	Ukraine	NUC
	G5549		ARW	Counter-Terrorism Lessons from Maritime Piracy and Narcotics Interdiction	Denmark	Colombia	EAPC-GLP
	G5556	×	MYP	Evaluation Support for Countering Violent Extremism at the Local Level	United States of America	Sweden	EAPC
	G5500		MYP	Standoff Coherent Detection of Warfare Chemicals via Photoacoustic Spectroscopy	Turkey	Ukraine	NUC
	G5536		MYP	Development of New Chemical Sensors and Optical Technologies for Fast and Sensitive Detection of Improvised Explosives	Spain	Israel	MD
	G5550		MYP	Gas Sensors for Preventing Terrorist Attacks	Slovenia	North Macedonia	EAPC-BLK
	G5543		ATC	Educate2Prevent: Education and Municipal Practitioners Exchange Workshops	Albania	North Macedonia	EAPC-BLK
	G5599	×	ATC	NATO-African Union Counter-Terrorism Capacity Building through Training and Education	Turkey	Algeria	MD
	G5486		MYP	Early Detection and Diagnosis of Emerging Biological Threats	Italy	Kazakhstan	EAPC-CAS

Key Priority	SPS Reference	Top-Down	Grant Mechanism	Title	NATO Country	Partner Country	Partnership Framework
Energy Security (1.b.)	G5464	✕	ARW	Innovative Energy Solutions for Military Applications (IESMA 2018)	Lithuania	Georgia	**EAPC**
	G5525	✕	MYP	Harmonised Energy Monitoring & Camp Simulation Tools for Energy Efficiency	Canada	Australia	**EAPC**
Cyber Defence (1.c.)	G5448		MYP	Quantum-safe Authenticated Group Key Establishment	Slovakia	Malta	**EAPC**
	G5479		MYP	Protection/Resilient Control of Cyber-Physical Systems against Malicious Attacks	Canada	Qatar	**ICI**
	G5515		ARW	Fundamental Readiness in Cyber Defence in the Balkans (FRCDB)	Bulgaria	Serbia	**EAPC-BLK**
	G5516		ARW	Governance for Cyber Security and Resilience for the Arctic	United States of America	Finland	**EAPC**
	G5485		MYP	Secure Quantum Communications through Submarine Optical Fibre Link between Italy and Malta (SEQIM)	Italy	Malta	**EAPC**
	G5511		MYP	Intelligent and Resilient Cyber Defence in Supply Chains and Logistics	Bulgaria	Finland	**EAPC**
	G5495		ARW	Physical and Cyber Safety in Critical Water Infrastructure	Norway	Ukraine	**NUC**
	G5531	✕	ATC	Advanced Cyber Defence Training – Azerbaijan	Turkey	Azerbaijan	**EAPC-CAU**

Key Priority	SPS Reference	Top-Down	Grant Mechanism	Title	NATO Country	Partner Country	Partnership Framework
CBRN Defence (1.d.)	G5469	✕	ARW	Countering Trafficking of WMD and CBRN Materials in a Maritime Environment – Challenges and Solutions	Greece	Israel	MD
	G5565	✕	MYP	Designing First Responders Versatile Detection and Decontamination Methods (DEFIR)	Estonia	Algeria	MD
	G5481		MYP	Selective Quantum Sensor for the Detection of CBRN Agents in Gas and Liquid Media	France	Ukraine	NUC
	G5489		ARW	Security and Resilience for Emerging Synthetic Biology and Biotechnology Threats	United States of America	Switzerland	EAPC
	G5571	✕	MYP	DIMLAB-Deployable CB Analytical Laboratory - Application of Nano-Bio Technology	Spain	Morocco	MD
Advanced Technologies (3.a.)	G5453		MYP	Radiation Hard UV Detectors against Terrorist Threats	United States of America	Israel	MD
	G5461		MYP	Large Scale Collaborative Detection and Location of Threats in the Electromagnetic Space	Spain	Switzerland	EAPC
	G5465		MYP	Noise Imaging Radar Network for Covert Air and Maritime Border Security (NORMA)	Italy	Ukraine	NUC
	G5482		MYP	Public Safety COmmUNication in ConTExt Related to Terror Attacks (COUNTER-TERROR)	Estonia	Pakistan	EAPC-GLP
	G5568	✕	MYP	Mobile Adaptive/Reactive Counter Unmanned Aerial System (MARCUS)	United States of America	Switzerland	EAPC
	G5477		MYP	Nanostructured Composite Paint for Electromagnetic Shielding	Greece	Ukraine	NUC
	G5493		ARW	Terahertz (THz), Mid InfraRed (MIR) and Near InfraRed (NIR) technologies for protection of Critical Infrastructures against Explosives and CBRN	Czech Republic	The Republic of Moldova	EAPC
	G5595	✕	ATC	Maritime Tactical and Operational Simulations	Italy	Tunisia	MD
	G5541		MYP	Improved Optical Imaging for Subsea Security Missions	Italy	Iraq	EAPC-GLP

Key Priority	SPS Reference	Top-Down	Grant Mechanism	Title	NATO Country	Partner Country	Partnership Framework
Support for Operations (2)	G5466		ARW	The Protection of Persons with Disabilities in Armed Conflict: Operationalizing Civilian Protection in the NATO Context	United States of America	Ireland	**EAPC**
Human and Social Aspects (3.d.)	G5570	✕	MYP	Responding to Emerging Security Challenges in NATO's Southern Neighbourhood	Belgium	Morocco	**MD**
	G5546	✕	ATC	Stress Management and Resilience Training	Bulgaria	Serbia	**EAPC-BLK**
Mine and Unexploded Ordnance (3.c.)	G5397	✕	ATC	Basic IED Field Exploitation Course (BIFEC)	Spain	Egypt	**MD**
Others (4)	G5544	✕	ARW	Pooling Expertise to Develop an Early Warning System to Counter Hybrid Threats	Lithuania	Ukraine	**NUC**

Annex 2: SPS Events – ARW, ATC, ASI – Hosted in 2018

SPS Ref.	Top-Down	Grant Mechanism	Title	NATO	Partner Country	Location	Dates
G5347		ARW	Functional Nanostructures and Sensors for CBRN Defence and Environmental Safety and Security	Germany	The Republic of Moldova	Chisinau, the Republic of Moldova	14-17 May 2018
G5356		ARW	Emerging Technologies for Determining Identity in the Context of Security	United Kingdom	Switzerland	Lausanne, Switzerland	10-12 July 2018
G5370		ARW	Enhancing Women's Roles in International Countering Violent Extremism Efforts	Spain	United Arab Emirates	Madrid, Spain	19-21 March 2018
G5371		ASI	Engineering Secure and Dependable Software Systems (Summer School Marktoberdorf 2018)	Germany	Switzerland	Marktoberdorf, Germany	31 July-11 August 2018
G5385		ARW	Risk Management of Terrorism Induced Stress – Guidelines for the Golden Hours (Who, What and When)	Netherlands	Ukraine	Odessa, Ukraine	14-16 September 2018
G5397	X	ATC	Basic IED Field Exploitation Course (BIFEC)	Spain	Egypt	Hoyo de Manzanares, Spain	16-27 April 2018
G5400	X	ARW	Cyber Defence Capacity Building in the Asia Pacific Region	Germany	Japan	Tokyo, Japan	3-6 April 2018
G5401		ARW	Defence Against Terrorism: Enhancing Resilience of Democratic Institutions and Rule of Law	Italy	North Macedonia	Skopje, North Macedonia	11-14 April 2018
G5409		ARW	Fundamental and Applied NanoElectroMagnetics II: THz Circuits, Materials, Devices	Italy	Belarus	Minsk, Belarus	5-7 June 2018
G5412		ARW	Armed Groups, Civilian Protection and United Nations Peacekeeping	United Kingdom	Ireland	Dublin, Ireland	7-9 November 2018

SPS Ref.	Top-Down	Grant Mechanism	Title	NATO	Partner Country	Location	Dates
G5414		ARW	Challenges in Strategic Communication and Fighting Propaganda in Eastern Europe – Solutions for a Future Common Project	Romania	The Republic of Moldova	Chisinau, the Republic of Moldova	25-27 April 2018
G5427		ATC	UAV Systems Development and Deployment to Counter Emerging Security Challenges	Poland	Ukraine	Kharkiv, Ukraine	27 May-2 June 2018
G5432		ARW	Environmental Health and Security in Ukrainian Conflict Zones	United States of America	Ukraine	Kyiv, Ukraine	10-12 May 2018
G5438	X	ARW	Black Swans on the Eastern Flank	Romania	Georgia	Bucharest, Romania	18-21 April 2018
G5439		ATC	Critical Infrastructure Protection – Best Practices and Innovative Methods of Protection	Poland	Morocco	Agadir, Morocco	6-12 May 2018
G5446		ARW	Security and Resilience of Information Systems Affected by Hybrid Threats	United States of America	Ukraine	Tallinn, Estonia	26-29 August 2018
G5452	X	ATC	Network Security and Cyber Incident Handling and Disaster Response Courses	Germany	Morocco	Rabat, Morocco	10-12 December 2018
G5464	X	ARW	Innovative Energy Solutions for Military Applications (IESMA 2018)	Lithuania	Georgia	Vilnius, Lithuania	14-16 November 2018
G5469	X	ARW	Countering Trafficking of WMD and CBRN Material in a Maritime Environment – Challenges and Solutions	Greece	Israel	Chania, Crete, Greece	15-17 May 2018
G5493		ARW	Terahertz (THz), Mid InfraRed (MIR) and Near InfraRed (NIR) technologies for protection of Critical Infrastructures Against Explosives and CBRN	Czech Republic	The Republic of Moldova	Liblice, Czech Republic	5-9 November 2018
G5495		ARW	Physical and Cyber Safety in Critical Water Infrastructure	Norway	Ukraine	Oslo, Norway	8-11 October 2018

SPS Ref.	Top-Down	Grant Mechanism	Title	NATO	Partner Country	Location	Dates
G5515		ARW	Fundamental Readiness in Cyber Defence in the Balkans (FRCDB)	Bulgaria	Serbia	Belgrade, Serbia	17-19 October 2018
G5519	X	ATC	NATO-ICI Regional Centre Kuwait – Critical Energy Infrastructure Protection Course	Germany	Kuwait	Kuwait	11-15 February 2018
G5520	X	ATC	NATO-ICI Regional Centre Kuwait – Chemical, Biological, Radiological and Nuclear (CBRN) Awareness for First Responders Course	Czech Republic	Kuwait	Kuwait	18-22 March 2018
G5524		ARW	Soft Target Protection	Slovakia	Ukraine	Prague, Czech Republic	17-19 October 2018
G5531	X	ATC	Advanced Cyber Defence Training Azerbaijan	Turkey	Azerbaijan	Baku, Azerbaijan	3-14 September 2018
G5546	X	ATC	Stress Management and Resilience Training	Bulgaria	Serbia	Belgrade, Serbia	10-14 December 2018

Annex 3: SPS MYPs Closed/Completed in 2018

SPS Reference	Top-Down	NATO Country	Partner Country	Other Countries	Title	Key Priority
G4617		United States of America	Ukraine		Nanostructured Metal-Semiconductor Thin Films for Efficient Solar Harvesting	Energy Security
G4622		Turkey	Israel		The Anthrax MntABC Transporter: Structure, Functional Dynamics and Drug Discovery	CBRN Defence
G4637		Hungary	Ukraine	France, United Kingdom, Israel	Development of Optical Bio-Sensors for Detection of Bio-Toxins	CBRN Defence
G4702		Estonia	Ukraine	France	Metal Nanocrystals for Highly Sensitive Detection of Biochemical Agents	CBRN Defence
G4705		Greece	Ukraine	Bulgaria, Greece, Japan	A SEnsor NEtwork for the Localisation and Identification of RAdiation Sources (SENERA)	CBRN Defence
G4753		Slovenia	North Macedonia	Slovenia	Smart I (eye) Advisory Rescue System (SIARS)	Support for Operations
G4775		Turkey	Israel		Development of a 100m Stand-off MM-Wave 3D Imaging System Based on a GDD Array	Counter-Terrorism
G4809		Spain	Republic of Korea		Compact Sensor Systems for Unmanned Aerial Vehicles	Advanced Technologies
G4835		Germany	Australia	United States of America	Mip as a Therapeutic Target to Treat Bio-Warfare Threat Agents	CBRN Defence
G4842		France	Tunisia	France, Portugal, Egypt	Self-Decontaminating Smart Textiles for Chemical Warfare Agents Degradation	CBRN Defence
G4856		United States of America	Ukraine		Ultra-Fast Adaptive Optical Elements	Advanced Technologies

SPS Reference	Top-Down	NATO Country	Partner Country	Other Countries	Title	Key Priority
G4919		United States of America	Republic of Korea		Privacy Preserving Big Data Processing Using Cloud Computing	Cyber Defence
G4925		Slovenia	Serbia		DURAPEM – Novel Materials for Durable Proton Exchange Membrane Fuel Cells	Energy Security
G4934		Italy	Georgia	United Kingdom, United States of America Azerbaijan, Kazakhstan	Security Against Geohazards at the Major Enguri Hydroelectric Scheme in Georgia	Energy Security
G4957	X	Canada	Ukraine	Belgium	Icing Mitigation Studies and Technology with Applications to Security Systems	Advanced Technologies
G4961	X	Belgium	Japan	Italy, Spain	RApid Skin Wound Healing by Integrated Tissue Engineering and Sensing (RAWINTS)	CBRN Defence
G5009	X	France	Mauritania		National System of Crisis Management Coordination in Mauritania – Extension of G4451	Counter-Terrorism
G5014	X	Italy	Ukraine	United States of America	Holographic and Impulse Subsurface Radar for Landmine and IED Detection	Mine and Unexploded Ordnance
G5080	X	Canada	Australia	United States of America	Tailor-Made Gender-Awareness Applications for the NATO Community	Other
G5217	X	Norway	Ukraine		Development of Mine and IED Recognition System Based on Ultrawideband Technology	Mine and Unexploded Ordnance
G5221		United States of America	The Republic of Moldova		The Republic of Moldova's National Plan to Implement UN Security Council Resolution 1325	Human and Social Aspects

Annex 4: NATO Science Series Publications in 2018

SPS Reference	Title	Editors	Series	Publisher	Volume
G5172	Cyber Defence in Industry 4.0 Systems and Related Logistics and IT Infrastructures	Dimitrov, K.	NATO Science for Peace and Security Series D: Information and Communication Security	IOS Press	51
G5391	Countering Terrorism and Urban Warfare	Niglia, A.; Yaakov, U.B.; Ezra, G.	NATO Science for Peace and Security Series E: Human and Societal Dynamics	IOS Press	140
G5257	Countering Terrorist Activities in Cyberspace	Minchev, Z.; Bogdanoski, M.	NATO Science for Peace and Security Series E: Human and Societal Dynamics	IOS Press	139
G5212	Nanostructured Materials for the Detection of CBRN	Bonca, J.; Kruchinin, S.	NATO Science for Peace and Security Series A: Chemistry and Biology	Springer Netherlands	N/A
G5219	Defence Against Bioterrorism	Radosavljevic, V.; Banjari, I.; Belojevic, G.	NATO Science for Peace and Security Series A: Chemistry and Biology	Springer Netherlands	N/A
G5187	Quantum Nano-Photonics	Di Bartolo, B.; Silvestri, L.; Cesaria, M.; Collins, J.	NATO Science for Peace and Security Series B: Physics and Biophysics	Springer Netherlands	N/A
G5310	Advanced Nanotechnologies for Detection and Defence against CBRN Agents	Petkov, P.; Tsiulyanu, D.; Popov, C.; Kulisch, W.	NATO Science for Peace and Security Series B: Physics and Biophysics	Springer Netherlands	N/A
G4589	Towards the Monitoring of Dumped Munitions Threat (MODUM)	Beldowski, J.; Been, R.; Turmus, E.	NATO Science for Peace and Security Series C: Environmental Security	Springer Netherlands	N/A

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1236-19 NATO GRAPHICS & PRINTING