The NATO Science for Peace and Security Programme

Overview of Science for Peace and Security Programme's Projects in Ukraine

September 2015

NATO Emerging Security Challenges Division

Security-related Scientific Cooperation with Ukraine

Ukraine has been actively engaged within the framework of the NATO Science for Peace and Security (SPS) Programme since 1991. This collaboration was intensified following an exchange of letters on cooperation in the area of science and the environment in 1999. Since May 2000, the NATO-Ukraine Joint Working Group on Scientific and Environmental Cooperation is meeting on a regular basis to review achievements and discuss topics of interests and priority areas for future scientific cooperation. Its most recent meeting was held on 18 September 2015 at the NATO Headquarters in Brussels.

In the light of the crisis in Ukraine and following the political guidance received from Allies at the Meeting of Foreign Ministers in April 2014 and at the NATO Wales Summit in September 2014, the SPS Programme substantially stepped up its practical cooperation with Ukraine. As a result, 16 new SPS activities (of which 12 are large-scale multi-year projects) with Ukraine were approved by Allies in 2014 alone, and an additional 9 activities have been approved as of mid-2015. The initial allocation of funds for activities with Ukraine in 2014 was more than doubled, making it the largest beneficiary of the SPS Programme. This trend is set to continue as new SPS initiatives in cooperation with the Mission of Ukraine to NATO and in line with Ukraine's needs and requests are being developed.

As cooperation expanded, so did the scope of topics addressed in SPS activities with Ukraine. Environmental concerns have long been the focus of SPS cooperation with many projects, for example on flood monitoring, having a direct, positive impact on local populations in Ukraine. Today, cooperation is focusing increasingly on emerging security challenges, such as defence against chemical, biological, radiological, nuclear (CBRN) agents, security-related advanced technologies, energy security and cyber defence.

By bringing together high-level scientists, collaboration through the SPS Programme often benefits not only Ukraine but creates global scientific networks and synergies with practical results.

NATO Assistant Secretary General for Emerging Security Challenges, Ambassador Sorin Ducaru, and the Ambassador of Ukraine to NATO, Ihor Dolhov speak about practical cooperation at a joint interview in December 2014.

The NATO Science for Peace and Security Programme

The Science for Peace and Security (SPS) Programme is a major NATO partnership programme. Created in 1958, it has become a brand for the Alliance and today provides opportunities for practical cooperation for NATO's wide network of partner countries through multi-year projects, training courses, research workshops and study institutes. SPS activities promote collaboration based on security-related civil science, technology, innovation and beyond and are guided by a set of key priorities aligned with NATO's strategic objectives to:

- address emerging security challenges, such as cyber defence, counter-terrorism, or defence against CBRN agents;
- support NATO-led missions and operations;
- support the development of security-related advanced technology;
- address human and social aspects of security.

DEFENCE AGAINST CHEMICAL, BIOLOGICAL RADIOLOGICAL AND NUCLEAR (CBRN) AGENTS

IDENTIFICATION AND NEUTRALIZATION OF CHEMICAL IMPROVISED EXPLOSIVE DEVICES (COMPLETED)

Increasingly, terrorists are combining conventional improvised explosive devices with highly toxic chemicals (Ch-IED), biological materials (B-IED) or radioactive materials (R-IED). Ch-IEDs, sometimes using chemical warfare agents (CWA), are designed to amplify the devastating effect of a classic IED, dispersing harmful and even lethal materials that cause more deaths and create a stronger psychological impact on their victims.

This training course was designed to enhance public security through improving international awareness and preparedness for response to Ch-IED attacks. It provided a forum for experts to explain advanced technology and best practices to prevent and manage the consequences of these deadly devices [ref. 984656]. *This project was led by experts and scientists from Poland (Military University of Technology) and Ukraine Institute of Bioorganic Chemistry and Petrochemistry).*

DEFENCE AGAINST CBRN AGENTS

The central objective of SPS activities in this field is to improve the ability of NATO and partners to protect their populations and forces from CBRN threats. The activities with Ukraine include research towards the development of CBRN defence capabilities, training courses and workshops.

SUPPORT TO HUMANITARIAN DE-MINING IN UKRAINE (ONGOING)

This new multi-year project will provide equipment and training for humanitarian demining in Ukraine, where landmines are a major problem. The project was initiated based on a request for assistance by Ukraine in identifying and destroying Explosive Remnants of War (ERW - landmines, artillery, munitions, booby traps, etc). An SPS fact-finding mission identified a need to replace equipment that ERW clearance teams lost as a result of the current conflict. These teams were normally based in Donetsk and Luhansk. The kick-off meeting for this project took place on 10 June 2015 in Kyiv [ref. 985024]. *NATO Support and Procurement Agency (NSPA) will lead this project in partnership with Ukraine (State Emergency Service of Ukraine).*

DETECTION TECHNOLOGIES

LONG-RANGE STAND-OFF MICROWAVE RADAR FOR PERSONNEL PROTECTION (ONGOING)

The detection of threats concealed under clothing is a clear challenge in a variety of civilian and military security environments. Technological advances are needed to allow military and law enforcement personnel to neutralize threats in moving crowds in order to stop an attack before it can affect the targeted infrastructure. This multi-year project aims to develop a portable warning system of on-body concealed weapons (IEDs, knives, handguns and grenades) at distances up to 20 meters. A unique feature of this detector is its ability to "learn" from and adapt to specific environments, allowing it to differentiate threats and 'clutter' from the moment it is deployed. This new, compact technology will enhance military and security personnel to react effectively in highly unpredictable environments [ref. 984992]. *This project is led by scientists and experts from Ukraine (Kiev Polytechnic Institute) and Canada (McMaster University).*

DEVELOPMENT OF AN ADVANCED X-RAY GENERATOR (ONGOING)

The scientists in this project have built a unique machine that produces high energy X-rays needed for high resolution image detection systems in the field of medicine, illicit trafficking, explosion detection, forensic detection and environmental security. Current models are very spacious and cost over €200 million. This innovative, cost-effective X-ray generator, located in the National Science Centre in Kharkiv, produces the same quality and performance while being much smaller in size and only costing €2 million. This project has helped to foster a new generation of young Ukrainian scientists working on the frontline of modern technology [ref. 977982]. *This activity is one of the largest multi-year projects of the SPS Programme. It is led by experts from Ukraine (Kharkov Institute of Physics and Technology), Russia, the Netherlands (Eindhoven University of Technology) and Germany.*

DETECTION TECHNOLOGIES

The SPS Programme is currently seeking new technologies to detect explosives and weapons remotely, in real-time, and without disputing the flow of pedestrian traffic.

MULTI-ACTOR COOPERATION

BEST PRACTICES AND LESSONS LEARNED IN CONFLICT MANAGEMENT: NATO, OSCE, EU AND CIVIL SOCIETY (COMPLETED)

How can International Organizations use innovative approaches to manage conflict and crisis situations? And what role can civil society play? This research workshop examines the conflict resolution and crisis management activities of NATO and the OSCE to identify best practices and lessons learned. The workshop also aims to gain a better understanding of the impact and function of civil society in these situations. Both innovative and traditional approaches will be assessed in an effort to improve NATO and OSCE's effectiveness and efficiency in this area. The workshop is particularly timely considering the ongoing regional crisis with Russia [ref: 984918]. *The workshop was held in June 2015 in Bratislava. The proceedings of the meeting are expected to published in early 2016. This project is led by experts from Slovakia (Research Centre of the Slovak Foreign Policy Association) and Ukraine (Foreign Policy Research Institute).*

WOMEN, PEACE AND SECURITY

The implementation of UNSCR 1325 and related Resolutions represents an important policy priority for NATO and partner countries. SPS is interested in analysing the main challenges for the implementation of UNSCR 1325 in the context of the military conflict in Ukraine.

INTERNATIONAL EXPERT SUPPORT FOR UKRAINE'S SECURITY AND DEFENCE REVIEW (COMPLETED)

On 19 and 20 May 2015, an SPS-funded research workshop brought together leading think tankers, international experts and representatives from civil society to discuss and provide expert advice on the key areas of the Comprehensive Security and Defence Sector Review initiated by the Ukrainian government. The workshop resulted in a collection of Green Papers that provide insights and research-based recommendations to Ukrainian policy-makers. The event proved to be a valuable platform to engage public research organisations, security and defence experts, NGOs and government representatives in a meaningful dialogue on a key issue on Ukraine's political security agenda. The results of the workshop also fed into the meeting of the senior-level NATO-Ukraine Joint Working Group on Defence Reform that took place a week after the SPS workshop [ref. G4903]. *This project is led by experts from Ukraine (Razumkov Centre) and Estonia (International Centre for Defence and Security).*

CYBER DEFENCE AND ADVANCED TECHNOLOGY WITH SECURITY APPLICATIONS

HANDS ON CYBER DEFENCE TRAINING COURSE FOR SYSTEM/NETWORK ADMINISTRATORS OF UKRAINE (COMPLETED)

Ukraine has experienced a surge in cyber attacks – even the presidential website was rendered inaccessible for several hours in 2014 as a result. To help strengthen Ukraine's cyber capabilities, a tailored hands-on cyber defence training course for system and network administrators has been developed together with the Security Service of Ukraine. Course curriculum includes fundamental cyber security protocols, services and technologies and offers an ability to identify system vulnerabilities and monitor network traffic. This complements work being carried out under the new NATO Cyber Security Trust Fund for Ukraine [ref. 984967]. *The course curriculum was developed by experts from Turkey (Middle East Technical University), Canada, Georgia, and Ukraine (Security Service of Ukraine). Due to the success of the course, follow-on cyber defence training is being considered by SPS, based on a request from Ukraine.*

ICING MITIGATION STUDIES AND TECHNOLOGY WITH APPLICATIONS TO SECURITY SYSTEMS (ONGOING)

Ice build-up can have hazardous effects on the functioning of military and security systems, affecting equipment on land, at sea and in the air. The presence of excess ice, for example, can cause marine vessels, Unmanned Aerial Vehicles (UAVs) and aircrafts to malfunction and in extreme cases, crash. This multi-year project aims to develop advanced coating materials needed to mitigate icing issues. Energy efficient strategies will also be explored, including anti-icing systems based on electrical heating [ref. 984957]. *Experts from Canada (York University), Ukraine (Odessa I.I. Mechnikov National University and Vladimir Martynovskiy Institute of Refrigeration, Cryotechnology and Ecoenergetics) and Belgium (Universite Libre de Bruxelles) are leading this project.*

CYBER DEFENCE

With increasing dependence on technology and on the internet, NATO is advancing its efforts to confront a wide range of cyber threats, including through the SPS Programme. For the first time in the history of the Alliance, these efforts now also extend to Partner nations, like Ukraine.

ENVIRONMENTAL SECURITY

REMEDIATION OF FUEL POLLUTED MILITARY SITE IN UKRAINE (ONGOING)

A military fuel deposit site established in 1975 is now located close to residential areas of Kyiv causing significant groundwater pollution in the area. This multi-year research project will enable Ukrainian experts to master complex and very efficient technologies for the remediation of residential areas near Kyiv. These technologies collect necessary data and design effective devices that could later be used for the remediation of other polluted areas in the country.

The project not only leads to capabilities to better protect the environment and populations. It also exemplifies the strong partnership relations between NATO and Ukraine to work on very diverse fields that are of interest to both sides [ref. 984585]. *This project is led by scientists and experts from France (Bureau de Recherches Géologiques et Minières) and Ukraine (Ministry of Defence, Ecological Unit). In 2015, Ukrainian scientists will be trained on new equipment provided by NATO and remediation of the polluted site is set to begin.*

ENVIRONMENTAL SECURITY

This key priority area of the SPS Programme involves addressing security challenges emanating from the physical and natural environment. Activities include addressing the impact of climate change and supporting partner countries in building local capabilities.

PROTECTING THE TISZA RIVER AGAINST POSSIBLE TOXIC ACCIDENTS (ONGOING)

The Tisza River is one of Central Europe's main rivers, releasing its water into the Danube. The basin that is shared by Hungary, Romania, Serbia, Slovakia and Ukraine has in the past experienced several disastrous spills of toxic chemicals, creating emergency situations for the local population. In this multi-year SPS project, experts from Romania and Ukraine work together to develop a joint monitoring and forecasting system for improved detection and management of toxic pollution. The resulting data and model will provide regional authorities with situational awareness at an early stage when preventive actions can still be taken in order to limit the disaster and its impact [ref. 984440]. *This project is led by experts from Ukraine (Institute of Environmental Geo-chemistry) and Romania (Babes-Bolyia University). It kicked-off in February 2014 and is expected to be completed in spring 2017.*

DEVELOPMENT OF NOVEL METHODS FOR IMPROVED SAFETY ASSESSMENT OF GAS PIPELINES

The project is addressing a common technical problem with aging gas pipelines that are risking disruptions of flow: hydrogen-induced pipeline degradation. The presence of hydrogen in the natural gas mix encourages corrosion and brittle fracture, which could lead to crack propagation and ultimately

pipeline failure. The research teams will develop a novel non-destructive method to diagnose impending infrastructure failures earlier, faster and more precisely based on indentation tests performed on the external surfaces of pipe segments without the need of extracting material specimen for laboratory testing. Such a tool will help prevent pipeline disruptions and their potentially negative security ramifications. The cooperation with experts from Italy and the funding by the SPS Programme will help Ukraine to build capabilities for a quick and reliable diagnosis of its national gas pipelines. The Ukrainian public gas transit company Ukrtransgaz would implement the novel methods [ref. 985055]. This project is led by experts from Italy (Politecnico di Milano) and Ukraine (Karpenko Physico-Mechanical Institute of the Academy of Sciences. The kick-off meeting is scheduled for early December 2015.

SUMMARY OF SELECTED SPS PROJECTS IN UKRAINE

NOVEL ELECTROCHEMICAL NANO-SENSORS FOR TOXIC ION DETECTION [MYP 984173]	
Project Co-Directors	Prof. Errachid Abdelhamid, Claude Bernard Lyon 1 Université, France Dr. Yaroslav Korpan, National Academy of Sciences, Ukraine Prof. Mykhaylo Gonchar, National Academy of Sciences, Ukraine Prof. Mounir Ben Ali, University of Sousse, Tunisia Prof. Mohammad ABBAS, National Research Centre, Egypt Prof. Aziz Amine, Université Hassan II, Morocco Prof. Valery Bliznyuk, Western Michigan University, United States Prof. Francis Vocanson, Université Jean Monnet, France
Status	Ongoing
Starting Date	1 November 2012

Abstract of Research

The Project is focused on the development of new biological and chemical micro/nanosensors and analytical kits for assays of different toxic ions in biological fluids and potable water using novel ion-recognizing molecules (ionophores), very effective natural ion-binding compounds and novel genetically constructed bio-molecules.

Major Objectives

The main objective of the proposed research is to develop smart, robust, reliable, selective, and sensitive bio/chemo-sensors and analytical kits for the detection of key toxic ions. Various scientific and technological objectives will be accomplished in order to fulfill the concept:

- Synthesis and characterization of specific ionophores selective to the desired ions;
- Development and robust packaging of sensing devices as well as software for data acquisition and analysis;
- Development and characterization of selective and specific laboratory prototype sensors for key toxic ions;
- Creation of ion assay kits using the developed sensors;
- Design and development of automated analytical systems based on the developed sensors;
- Validation of the developed automated analysis system against standard methodologies on real samples;
- Technology transfer within the project and to end-users.

Overview of Achievements

A variety of novel ion-selective molecules have been synthesized and tested on both water and biological samples in the labs in UKR and EGY, and their effectiveness modeled by the TUN group. Meanwhile, the FRA group is developing the microfluidic platform into which these molecules will be integrated to form sensors. Integration has begun and the testing of prototypes will commence shortly.

Expected Results

This project should produce novel sensor prototypes for selective and sensitive toxic ion detection.

NOVEL NANOCOMPOSITE CARBON MATERIALS FOR ELECTROCHEMICAL SHIELDING [MYP 984243]	
Project Co-Directors	Prof. Peter Scharff, Technical University of Ilmenau Germany Dr. Lyudmila Matzui, Taras Shevchenko National University of Kyiv, Ukraine Dr. Alexander Shames, Ben-Gurion University of the Negev, Israel Dr. François Le Normand, Centre national de la recherche scientifique (CNRS), France
Status	Ongoing
Starting Date	April 2012

Abstract of Research

This Project is developing new nanocarbon-based composite materials possessing controllable electric and electronic characteristics which make them useful for shielding sensitive components from electromagnetic radiation with far less weight than equally effective metal shielding. These materials will be tested by the pilot-scale creation of absorbing and protective shields against microwave radiation. Paints and varnishes for deposition of protective coatings as well as solid plates with high absorption = will be produced and evaluated both for shielding effectiveness and for its suitability for manufacturing.

Major Objectives

Correspondingly, the main goals are :

- To develop nanocarbon-epoxy, nanocarbon – varnish, and nanocarbon-polyethylene materials for use in electromagnetic shielding.
- To produce and test prototype paints and solid plates with high microwave absorption using these materials

Overview of Achievements

A wide variety of nanocarbon-composite materials have been produced in the laboratory and tested for their ability to shield against microwaves. These materials have exhibited up to 10,000-fold (40 dB) screening of microwave radiation (25–50 GHz) at 1 mm thickness along with good mechanical and coating properties on a range of surfaces.

Expected Results

These materials will further be tested for their durability and manufacturing suitability and the best will be presented to industry for potential application in electromagnetic shielding where they may be able to replace much heavier metal coatings.

A MODEL TO PREDICT AND PREVENT POSSIBLE DISASTROUS EFFECTS OF TOXIC POLLUTION IN THE TISZA RIVER WATERSHED [MYP 984440]	
Project Co-Directors	Dr. Mihail Simion Beldean-Galea, BabeşBolyai University, Romania Dr. Georgiy Lysychenko, National Academy of Sciences of Ukraine and Ministry for Emergencies and Affairs of Population Protection against the Consequences of Chernobyl Catastrophe of Ukraine, Ukraine
Status	Ongoing
Starting Date	23 February 2014

Abstract of Research

The project aims to create a system of joint monitoring, forecasting and information sharing to assist a coordinated approach for preventing pollution of transboundary rivers in Romania and Ukraine. The research will include an inventory of the threats and hazardous sources, a list of hazardous substances (pollutants) that can enter into the river in emergency situations, the harmonization and development of the sampling and analytical procedures in agreement with the requirements of the European Water Framework Directive (WFD) and Environmental Quality Standards Directive (EQSD) and the assessment of a scenario based emergency situation in a pilot area by computer simulation.

Major Objectives

The Tisza river is one of Central Europe's main rivers, releasing its water into the Danube. The basin that is shared by Hungary, Romania, Serbia, Slovakia, and Ukraine has in the past experienced several disastrous spills of toxic chemicals, resulting in emergency situations for the effected population.
The project teams from Romania and Ukraine are creating a joint monitoring and forecasting system for improved detection and management of accidental or deliberate toxic pollution. Based on the data, a model will be developed and the knowledge will be transferred to authorities in the region assisting them in their defence against disasters.

Overview of Achievements

The teams made field investigations in the upper Tisza River Basin in Romania and Ukraine in order to determine the actual pollution using the existing standardized methods of analysis and the methods developed in the project have been started. The obtained results were disseminated to all end-users, stakeholders and general public using the project website, written reports and scientific materials. Special attention is focused on the elaboration of a guideline for a common prevention plan between Ukraine and Romania, for the Tisza River Watershed, to minimize the negative pollution consequences related to the NATECH events. The Ukrainian expert team and end-user took part at the field trip and investigations in the Romanian Tisza River Watershed organized by the NATO country Co-Director. The main benefits of this meeting were the possibility to have common discussions between the Romanian stakeholders and representatives of State Ecological Inspections in Trans-Carpathian Region regarding the performed actions, the obtained results and the ways for the implementation of the results at their institutions. As a conclusion, the meeting was fruitfully because the major difficulties met during the first six months were discussed and the modalities to solve them were found.

Expected Results

The resulting data and model will be used to develop of general guidelines for a joint preventive plan between Ukraine and Romania. This will be an important tool for emergency planning and disaster response. At the same time this cooperative work is building trust and confidence between the countries. The project was kicked-off in February 2014 and is expected to be completed in spring 2017.

THERMOELECTRIC MATERIALS AND DEVICES FOR ENERGY SAVING AND IMPROVED SECURITY [MYP 984536]	
Project Co-Directors	Prof. Rasit Ahiska, Gazi University, Turkey Dr. Lyubomyr Nykyruy, Vasyl Stefanyk Precarpathian National University, Ukraine
Status	Ongoing
Starting Date	February 2014

Abstract of Research

This project is developing new, higher efficiency thermoelectric materials, that is materials which generate electricity from heat or, operating in 'reverse' cool without refrigerants. The materials developed in this project are optimized for moderate temperatures, 170–600° C so that they would be useful, for example, for generating electricity from a campfire in the field.

Major Objectives

The major objectives are the synthesis and optimization of high-efficiency, moderate-temperature thermoelectric materials and their incorporation into a prototype power-generating module.

Overview of Achievements

Synthesis and testing of thermoelectric materials have begun with the optimal compound composition for this temperature range determined for several fabrication techniques. Excellent thermoelectric efficiency (ZT=2) has been obtained. The process of incorporating these materials into electricity generating modules is underway and once these modules are ready, they will be demonstrated.

Expected Results

This project should result in new technology for better small- to medium-scale field power generation. One potential application is a device that can recharge the batteries of a unit in the field from the energy of their campfire.

UNCOOLED THZ ARRAYS FOR IMAGING EXPLOSIVES [MYP 984544]	
Project Co-Directors	Prof. Ernesto Dieguez, Universidad Autonoma de Madrid, Spain Prof. Fedir Sizov, National Academy of Sciences, Ukraine Dr. Ralph James, Brookhaven National Laboratory, United States Prof. Carlo Corsi, Centro Ricerche Elettro Ottiche, Italy Dr. Serguei Maltsev, Scientific Industrial Enterprise "ORION", Ukraine
Status	Ongoing
Starting Date	May 2014

Abstract of Research

This project addresses the emerging security demands in terahertz (THz) sensing for the detection of concealed weapons, drugs, and explosives. The main goal is the creation of active THz imaging prototype with a linear array of detectors. With its enhanced sensitivity for THz detection, it will be capable of actively operating at ambient temperatures or slightly cooled ones, in contrast to many current detectors which require active cooling.

Major Objectives

The project is investigating a new technology for fabricating THz sensitive films with arrays of integrated micro-antennas. Once developed these THz sensitive arrays will be incorporated into a prototype imager.

Overview of Achievements

The optimal fabrication and deposition parameters of the THz-sensitive layers for have been determined. Methods of achieving 'good' antenna pattern on thick substrate have been found, and aspheric lenses for THz imaging have been designed and manufactured. Work is now underway on a prototype imaging system based on these newly developed detectors.

Expected Results

This project should result in a prototype high-efficiency uncooled THz imager based on the newly developed arrays. Such an imager could help improve the detection of concealed threats with imaging times acceptable for a wider range of screening applications.

REMEDIATION OF HYDROCARBON POLLUTED MILITARY SITE IN UKRAINE [MYP 984585]	
Project Co-Directors	Mr. Stefan Colombano, Bureau de recherches géologiques et minières (BRGM), France Mr. Yevhen Uskov, Ministry of Defence, Ukraine
Status	Ongoing
Starting Date	November 2013

Abstract of Research

A military fuel deposit site established in 1975 is now located close to residential areas in Kyiv causing significant groundwater pollution in the area. The origin of the pollution is accidental and dates from the time of the former Soviet Union.

Major Objectives

This multi-year research project will enable Ukrainian experts to master complex and very efficient technologies for the remediation of residential areas new Kyiv. The goal of the project is to define a more efficient technology to eliminate the main pollution and use the result of this research to remediate other sites. Ukrainian scientists will receive training on the use of the new equipment.

Overview of Achievements

The equipment for the treatment of the site has been delivered in September 2015. Remediation of the polluted site is set to begin.

Expected Results

These technologies collect necessary data and design effective devices that could later be used for the remediation of other polluted areas in the country. The project not only leads to capabilities to better protect the environment and populations. It also exemplifies the strong partnership relations between NATO and Ukraine to work on very diverse fields that are of interest to both sides.

INTERNATIONAL EXPERTS SUPPORT FOR UKRAINE'S SECURITY AND DEFENCE REVIEW [ARW 984903]	
Project Co-Directors	Mr. Martin Hurt, International Centre for Defence and Security, Estonia Mr. Oleksiy Melnyk, Razumkov Centre, Ukraine
Status	Ongoing
Dates	19 – 20 May 2015

Abstract of Research

The Ukrainian security and defence sector has been under continuous transformation for more than two decades. However, the country found itself absolutely unprepared for the threats to national security, which occurred during the ongoing Ukrainian crisis and which has exposed systemic problems in the country's security and defence sector. The new Ukrainian government initiated a Comprehensive Security and Defence Sector Review (CSDSR). In light of the new political and strategic situation of Ukraine, success of the current attempt to start a comprehensive reform of the national security and defence sector is of vital importance to the future of Ukraine as a viable and effectively governed democratic state able to deal with a full range of internal and external threats and risks to national security.

Major Objectives

Much of the above elements of a successful strategic review process can be brought together by offering a platform for the government to engage public research organisations, security and defence experts and NGOs in a meaningful, substantial and effective dialogue and consultation. The ongoing political change is bringing along a new dynamics of government's openness to dialogue with non-governmental experts, willingness to hear new research evidence and alternative expert assessments, incorporate new ideas and best practices as well as apply new innovative techniques of strategic analysis. This represents an opportunity for the Ukrainian national research community and security and defence experts from NATO to make a substantial collaborative contribution to the CSDSR.

This ARW will reinforce the efforts of the Ukrainian government to reform security and defence sector in accordance with the principles and best practices of NATO. By bringing together NATO and Ukrainian experts and researchers, it will support dialogue and collaborative effort in the area of strategic analysis.

Overview of Achievements

The objectives of the Advanced Research Workshop is to generate a collection of Green Papers, based on the results of research and drawing upon expert advice, for each of the five areas falling under the Ukrainian CSDSR: national threat assessments, national defence, internal security, crisis management system and defence industry. The project will contribute to strengthening the strategic analysis capability of Ukraine's government, which is of critical importance in the government's ability to fulfil one of its core functions – national security and defence.

Expected Results

Publication of the results of the meeting is expected for September 2015. The paper, published by the International Centre for Defence and Security of Estonia, will feature the key findings and policy recommendations of the ARW and will also include other subject-matter papers.

REDEFINED CHERNOBYL CONFINEMENT MODEL – ASSISTING UKRAINE IN MANAGING THE RADIOACTIVE DUST DISTURBANCES AND LEAKS AND PROTECTING THEIR WORKERS [MYP 984906]	
Project Co-Directors	Dr. Gunter Pretzsch, Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH, Germany Dr. Pavel G. Krukovsky, Institute of Engineering Thermophysics, Ukraine Viktor Krasnov, Institute for Safety Problems of Nuclear Power Plants (ISPNPP) National Academy of Sciences of Ukraine
Status	Ongoing
Starting Date	28 January 2015

Abstract of Research

The project teams will develop, verify and apply a 3-D computer model for the distribution and movement of highly radioactive dust and aerosols inside and outside the destroyed unit 4 of the Chernobyl Nuclear Power Plant (the "old sacrophagus"). The model will be based on a huge data collection of past measurements that the co-directors of this project have gathered since the accident happened nearly three decades ago. Furthermore, new extensive real-time measurements, carried out in close cooperation with all stakeholders.

Major Objectives

For more than 26 years after Chernobyl disaster, the destroyed Unit 4 of is a source of radioactive contamination of the surrounding environment and beyond. The old sacrophagus has many holes through which radioactive dust is leaking out of control. To protect the personnel, the population and the environment from the negative effects of radioactive leaks and to create a protected shelter for further dismantling the old sacrophagus, a New Safe Confinement (NSC) is being built by the French consortium Novarka. According to updated time estimates, it should be placed over the old sacrophagus in 2017.
The 3-D computer model that the project teams are developing will help decision makers to find and control leaks and to protect their workers while placing the NSC and while dismantling the old sacrophagus

Overview of Achievements

The current state of aerosol contamination spread models were studied, including the factors that influence the distribution. The possible thermal and aerodynamic interaction of the old sacrophage and the NSC was studied. A first geometrical model was developed based on defined main assumptions. Leaks of the old sacrophage and the NSC were located. Possible meteorological conditions were determined.

Expected Results

The project will detect leaks and predict the aerosol contamination, providing Ukrainian authorities with a decision making tool. The 3-D model will help to -
predict the outcome of the commissioning of the NSC;
predict radioactive dust movement, leaks and collapses during the dismantling of the old sarcophagus that is planned to be carried out underneath the NSC;
take appropriate measures to protect the workers;
constantly monitor the functionality of the NSC;
predict and estimate the transport of radioactivity that will leak from the NSC into the surrounding area and beyond.
The project was kicked-off in January 2015 and is expected to be completed in December 2017.

ICING MITIGATION STUDIES AND TECHNOLOGY WITH APPLICATIONS TO SECURITY SYSTEMS [MYP 984957]	
Project Co-Directors	Prof. Alidad Amirfazli, York University, Canada Prof. Sergey Kontush, Odessa I.I. Mechnikov National University, Ukraine Prof. Vitaly Zhelezny, Vladimir Martynovskiy Institute of Refrigeration, Cryotechnology and Ecoenergetics, Ukraine Dr. Carlo Saverio Iorio, Université Libre de Bruxelles, Belgique
Status	Ongoing
Starting Date	15 June 2015

Abstract of Research

Icing can cause major interferences for functioning of various systems that are very closely related to security issues. Examples include icing of sea vessels or off shore platforms that are or need to be operational in high latitudes. Icing build-up on communication antennas, weapon systems (for military vessels), accumulation on the deck and various safety systems all are hazardous from a security and functioning perspectives for off shore platforms and vessels. Ice build-up on aerodynamic structures deteriorates their performance; for UAVs and aircrafts this means they cannot function safely and in extreme cases can crash, whereas for wind turbines it can reduce annual power production by up to 15% when installed in areas that are susceptible to icing. Understanding drop shedding and development of coatings that can be used for mitigating icing can lead to advanced systems to combat icing of various military assets.

Major Objectives

The project aims to achieve tangible benefits in terms of technology development for combating icing issues in systems of interest to military, e.g. UAV and communication antennas/dishes, as well as operating vessels in high seas. Icing can cause major interferences for functioning of various systems that are very closely related to security issues. It can be debilitating issue for many systems in military and security areas, e.g. sea spray icing for marine vessels, icing of aircrafts and communication antennas. Consequently, icing exploration platforms is an issue that requires solutions to endure safe operations.

Overview of Achievements

The co-directors conducted their kick-off meeting in Odessa on June 20th, 2015. They discussed the way forward, inspected the laboratories and met with the personnel. They are now organizing their work load and taking care of the last organizational aspects of the project.

Expected Results

The project has the potential for positive impact on multiple levels: (1) contributes to the development of passive technologies for mitigating icing through development and understanding of coatings that repel water; (2) understanding of drop shedding especially the saline water is very novel as it is poorly studied; (3) the project can be a conduit for development of energy efficient anti-icing systems for systems made of composite structures, e.g. UAVs, wind turbine, and antennas. Success of this project can lead to development of novel coatings that can mitigate icing, and potentially can lead to development of much needed energy efficient anti-icing system for composite structures. The value of the fundamental knowledge developed regarding understanding of water accumulation on surfaces can also positively impact wider scientific community.

ADDRESSING SECURITY RISKS AT THE UKRAINE BORDER THROUGH BEST PRACTICES ON GOOD GOVERNANCE [ARW 984985]	
Project Co-Directors	Dr. Rafal Kesek, Kosciuszko Institute, Poland Mr. Maxim Boroda, Ukrainian Institute for Public Policy, Ukraine
Status	Ongoing
Starting Date	24-25 October, 2015

Abstract of Research

The aim of this Advanced Research Workshop is to contribute to raising awareness on corruption as a security risk within Custom and Border Guard Agencies. The intended outcome of this workshop is improved Border Management practices in Ukraine and border security through greater transparency, accountability, integrity and good governance.

Major Objectives

The Advanced Research Workshop will allow international experts from academia, civil society and Border Management and Customs organisations, as well as International Organizations to cooperate and share best practices on border management and anti-corruption measure in the defence and security sectors in order to attain a comprehensive understanding of the issues at stake. This cooperation should facilitate the exchanges of lessons learned to further identify, prevent and counteract threats to border security.

Overview of Achievements

This event will allow experts to formulate guidelines and recommendations to prevent the risk of corruption while enhancing security through integrity, accountability, and transparency. The intended outcome of this ARW is to assist local participants in implementing NATO Building Integrity Peer Review Report and its resulting recommendations, as agreed by the Ukrainian National Security and Defence Council apparatus leading the cooperation with the NATO BI Programme (the State Border Guards Service participated in the completion of the NATO BI Self-Assessment Questionnaire and Peer Review Process in 2013). The solutions identified and the recommendations formulated in the course of the ARW could be later published as guidelines and made available to a wider audience.

Expected Results

By promoting better Border Management practices while raising awareness on the risks and consequences related to corruption, the workshop could contribute to strengthening border management institutions and therefore to making Ukraine's borders more secure. Furthermore, it could help develop solutions to counter corruption and organised crime in border regions and improve border crossing for inhabitants of border regions, migrants and refugees.

HOLOGRAPHIC AND IMPULSE SUBSURFACE RADAR FOR LANDMINE AND IED DETECTION [MYP 985014]	
Project Co-Directors	Prof. Lorenzo Capineri, University of Florence, Italy Dr. Gennadiy Pochanin, Usikov Institute for Radiophysics and Electronics, Ukraine Prof. Timothy Bechtel, Franklin and Marshall College, United States
Status	Approved
Starting Date	19 October 2015

Abstract of Research

Detecting buried explosives is a vital security issue. The development of techniques which are sage and that enable rapid detection with a low number of false alarms is crucial. Blending existing technologies to provide new solution may constitute an improvement but not a significant advance, from an operational viewpoint. This project enhances the detection of dangerous targets with diminished false alarms, allowing faster, cheaper, and safer clearance of former conflict zones through the implementation of new, combined techniques of holographic and acoustic methods.

Major Objectives

The project proposes to develop a remotely-operable, robotic, multi-sensor device for detection of UXO, mines, and IEDs. The device uses subsurface radar with imaging and target classification to discriminate dangerous targets from harmless clutter. The project will aim to achieve the following three goals: (1) compare the detection performance Probability of Detection (PD) and Probability of False Alarm (PFA) of existing holographic and impulse radars, electromagnetic induction and infrared imaging for landmines, UXO and IEDs under different soil conditions, (2) construct an autonomous or remote operation high spatial resolution scanner (portable and low cost) for subsurface object detection and classification using new and combined holographic radar and acoustic technologies, (3) develop effective target classification algorithms to improve the scanner's reliability (high PD) and productivity (low PFA and scanning speed).

Overview of Achievements

The award was recently granted. The co-directors plan to meet on 19 October 2015 in Florence, Italy to have their kick-off meeting and plan the way ahead. The State Emergency Service of Ukraine is an end-user in the project who will benefit from the applications resulting from the project.

Expected Results

The most important project outcome is the enhanced detection capability of buried IEDs and mines by the development of more efficient algorithms based on the combination of several detection techniques. The co-directors expect to have a design and a prototype of the device described above, plus numerous technology spin-offs from the hardware, algorithms, and software that must be developed to realize the project goals. Other impacts include the possibility to demine larger areas of land more safely and efficiently, open new possibility in demining in a range of appropriate soil conditions, diminish the number of casualties among demining personnel and civilian and reduce the overall cost of demining.

BORDER SECURITY CHALLENGES IN EASTERN EUROPE: LESSONS FOR ALLIES AND PARTNERS [ARW 985015]	
Project Co-Directors	Mr. Michal Baranowski, German Marshall Fund of the United States, Poland Mr. Victor Chirila, Foreign Policy Association, Republic of Moldova Ms. Alyona Getmanchuk, Institute of World Policy, Ukraine
Status	Ongoing
Starting Date	Ukraine: December 3 - 4, 2015 Rep. of Moldova: April 7 - 8, 2016

Abstract of Research

This workshop aims to assess lessons learned and to develop concrete recommendations for NATO and its partners on border security issues, to be developed through two workshops that would take place in Ukraine and the Rep. of Moldova respectively. To broaden the understanding of today's security challenges, particularly those relevant to the tactics used in both region, a session of each workshop will be devoted to the topic of hybrid warfare.
These workshops will discuss and assess crucial aspects and commonalities, comparing and contrasting the situation of the recent conflict in the Donbas region, and a "frozen" conflict in Transnistria. Having a perspective from both regions where border security challenges are most vivid will allow the drawing of conclusions that can be applicable on a wider scale – both among NATO Partners and NATO member countries.

Major Objectives

Each meeting will bring together a group of 25 to 35 security experts, strategic thinkers and senior policymakers to explore the border security priorities for regional cooperation in the years to come, and serve as a forum to stimulate much-needed security dialogue on looming threats and possibilities for cooperation. Increased cooperation, sharing best practices and fostering expert discourse are essential for reshaping our approach and strategies in the present security environment.

Overview of Achievements

The current security environment in Ukraine has fundamentally changed the situation at Europe's eastern borders. It is important to expand the understanding of border security by addressing timely topics and arising threats. Eastern Europe currently faces a number of ongoing and potential threats to border security. In this same vein, monitoring the evolving situation with regard to the Republic of Moldova's border security is vital in order to allow for an early warning mechanism should the security situation deteriorate.

Expected Results

Subsequent to these two workshops, a report will be produced to present findings and recommendations on border security and hybrid warfare challenges facing Allies. In order to increase the level of outreach, the final results will be presented in Brussels, Belgium.

SUPPORT TO HUMANITARIAN DEMINING IN UKRAINE [MYP 985024]	
Project Co-Directors	Mr. David Towndrow, NATO Support Agency, Luxembourg Mr. Oleg Bondar, State Security Service of Ukraine, Ukraine Mr. Scott Willason, NATO Support Agency, Luxembourg
Status	Ongoing
Starting Date	10 June 2015

Abstract of Research

Ukraine is working to manage the significant increase in demand for ERW clearance and demining capability resulting from the current security situation. These hazards have resulted in numerous military and civilian casualties, been a major contributing cause to the humanitarian crisis currently unfolding in the contested regions. The new operating environment has caused the need to operate at higher risk and tempo than what the current organizational structure, equipment and training can cope with. In addition, a considerable part of the equipment of State Emergency Service of Ukraine (SESU) teams was either confiscated or damaged during the crisis. There is a particular need to improve the capacity of these teams operating in the Eastern districts where the local population is either at risk or unable to return to areas affected by mines, IEDs and other ERW.

Major Objectives

Based on the request for assistance by Ukraine, the main goal of this project is to enhance the capacity of the SESU in undertaking humanitarian demining operation in areas affected by the conflict in Eastern Ukraine. In this context, the term "humanitarian demining" refers to the search for, identification and destruction of Explosive Remnants of War (ERW) including landmines, artillery, munitions and booby traps with the aim of safeguarding the civilian population within affected areas and to allow the return of persons displaced by the conflict. A fact-finding mission to Ukraine was organized by the SPS Programme with the participation of NSPA and PASP in October 2014 and it was concluded that the immediate requirement was to replace equipment lost by ERW clearance teams of the SESU, normally based in the Donetsk and Luhansk regions, as a result of the conflict. It was also indicated that additional technical and operation training would be beneficial. With this project, SESU ERW teams will be introduced to and provided with modern technologies of detection and clearance and associated specialist training so that they can cope with the additional challenges brought about in a higher threat environment.

Overview of Achievements

Following the kick-off meeting, work has been going on for the procurement and delivery of the necessary equipment. The training for Ukrainian experts will be provided in the first quarter of 2016.

Expected Results

The project is based on two areas of activity mutually supporting each other which is to provide an appropriate level of operational capability to four ERW clearance teams. Equipment would include: dual sensor mine detectors, deep search and bomb locators, Individual Personal Protection Equipment, a range of specialist tools, lifting equipment and lighting equipment, munitions disarming equipment, and excavation and extraction equipment. The training element of this project is primarily associated with equipment specific operator training, where required as well as training to be provided at the Explosive Ordnance Disposal Centre of Excellence (EOD CoE) in Slovakia such as Explosive Ordnance Reconnaissance operations, operator training up to International Mine Action Standards (IMAS) Level 3 and Quality Management Training for EOD/demining operations.

DEVELOPMENT OF NOVEL METHODS FOR IMPROVED SAFETY ASSESSMENT OF GAS PIPELINES [MYP 985055]	
Project Co-Directors	Prof. Gabriella Bolzon, Politecnico di Milano, Italy Prof. Hryhoriy Nykyforchyn, Karpenko Physico-Mechanical Institute of the Academy of Sciences, Ukraine
Status	Approved
Starting Date	Planned for the beginning of December 2015

Abstract of Research

The project is addressing a common technical problem with aging gas pipelines that are risking disruptions of flow: hydrogen-induced pipeline degradation. The presence of hydrogen in the natural gas mix encourages corrosion and brittle fracture, which could lead to crack propagation and ultimately pipeline failure. The research teams will develop a novel non-destructive method to diagnose impending infrastructure failures earlier, faster and more precisely based on indentation tests performed on the external surfaces of pipe segments without the need of extracting material specimen for laboratory testing. Such a tool will help prevent pipeline disruptions and their potentially negative security ramifications.

Major Objectives

The project teams aim to 1) develop a diagnostic tool that allows the identification of hydrogen-induced pipeline degradation earlier, faster and on site, without interrupting operations; 2) disseminated results at international conferences, by publication in international journals and through a project specific website; 3) transfer knowledge to the end-user Ukrtransgaz for possible possible implementation on industrial scale.

While this research project does not involve NATO in the protection of Ukraine's critical energy infrastructure (bearing in mind that Critical Energy Infrastructure Protection remains a national responsibility), it will help Ukraine build the capabilities to better secure its own critical infrastructure, thereby helping to prevent political and economic risks that could have significant security consequences for NATO

Overview of Achievements

Following approval of the project by PCSC in August 2015, the budget items, milestones and reporting dates are currently being finalized, the initial grant letter is being prepared and the kick-off meeting is scheduled for early December 2015. Hence, there are no achievements yet to report.

Expected Results

The cooperation with experts from Italy and the funding by the SPS Programme will help Ukraine to build capabilities for a quick and reliable diagnosis of its national gas pipelines. The Ukrainian public gas transit company Ukrtransgaz would implement the novel methods.

The novel method, proposed by the co-directors, is quite universal in its nature and can be applied not only for gas, but also for petroleum fuel pipeline diagnosis. In this regard, the NSPA (CEPS Programme) expressed interest in the project findings.

The project direction is estimated to be 3 years.

THE MILITARY CONFLICT IN UKRAINE AND UNITED NATIONS SECURITY COUNCIL RESOLUTION 1325 [ARW 985066]	
Project Co-Directors	Nicoletta Pirozzi, Instituto Affari Internazionali (IAI), Italy Ella Lamakh, Democracy Development Center, Ukraine
Status	Ongoing
Starting Date	21 September 2015

Abstract of Research

This Advanced Research Workshop aims to bring together leading experts and voices from Ukraine with the international community to further analyze and discuss the specific participation and protection gaps women and girls face in Ukraine today in light of the ongoing crisis, and will address opportunities to increase the participation of women in conflict resolution.

Major Objectives

Recognizing that United Nations Security Council Resolution (UNSCR) 1325 calls for improving strategies aimed at the prevention of violence against women and girls in armed conflict, and advocates for greater participation of women in conflict prevention, crisis management and peace-building efforts, this workshop looks in detail at what measures have and should be put in place to address these pillars. In this light, the gaps in national legislation on the issue of equal participation of women in conflict resolution and peace building processes will be analysed in order to provide recommendations on how they can be overcome.

The workshop also serves to create awareness of the principles and ideas behind UNSCR 1325, with a particular focus on the main commitments and obligations behind the resolution. In addition, it will encourage the viewing of the present situation in Ukraine with a gender perspective, and outline a concrete way forward.

Overview of Achievements

The intent is to :

- Analyse the impact of the ongoing crisis in Ukraine on women and girls, and evaluate the participation and protection gaps.
- Analyse the main challenges for the implementation of UNSCR 1325 in the Ukrainian context;
- Draw on MIA and MoD as the key locomotives in developing a National Action Plan for UNSCR1325 for Ukraine;
- Discuss with MIA and MoD the ideas and tasks of the Resolution, including preliminary results of the working group at the Ministry of Social Policy (MSP);
- Take stock of the recommendations from grassroots and local NGOs to MIA, MoD and regional local authorities;
- Engage regional and international actors in the implementation process of UNSCR 1325 as viable instrument of gender-sensitive approach and gender mainstreaming in peace building.

Expected Results

These endeavours have the ultimate goal of improving defence capabilities for Ukraine by creating efficiency & effectiveness through the integration of women.

NATO and its partners continue to work towards the participation of women in conflict prevention, management and resolution, and peace building, as well as in post-conflict efforts and cooperation. NATO and its partners aim to ensure that a gender perspective is mainstreamed into policies, activities and efforts to prevent and resolve conflicts. Due regard will be given to the social roles of both men and women and how these may lead to different risks and security needs. Attention will also be paid to how these roles may translate into different contributions to conflict prevention and resolution.

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OVERVIEW OF ONGOING SPS ACTIVITIES WITH UKRAINE AS OF SEPTEMBER 2015

Project Number	Mechanism	Title	Countries	Institutions
977982	Multi Year Project	Development of an Advanced X-Ray Generator Based on Compton Back-Scattering - Extension	Netherlands, Ukraine	Eindhoven University of Technology (TUE) Kharkov Institute of Physics and Technology - National Science Center
984091	Multi Year Project	Microwave Tunable Materials, Composites, and Devices	Slovenia, Ukraine	Jozef Stefan Institute National Academy of Sciences
984173	Multi Year Project	Novel Electrochemical Nano-Sensors for Toxic Ions Detection	France, Ukraine	University Claude Bernard Lyon 1 Institute of Cell Biology
984189	Multi Year Project	Novel Macromolecular Complexes for Rapid Detection of Hazardous Agents	UK, Ukraine	Aston University National Academy of Science Institute of Physics and Institute of Organic Chemistry
984243	Multi Year Project	Novel Nanocomposite Materials Based on Low Dimensional Carbon Systems for Electromagnetic Shielding	Germany, Ukraine	Technical University of Ilmenau Taras Shevchenko National University of Kyiv (KNU)
984398	Multi Year Project	Removal of Heavy Metals and Radionuclides from Water using Ceramic Membranes	Slovenia, Ukraine	Centre of Sensor Technology, University of Maribor Chuiko Institute of Surface Chemistry, National Academy of Sciences (Institute of Chemical Process Fundamentals, Academy of Sciences)
984440	Multi Year Project	A Model to predict and prevent possible Disastrous Effects of Toxic Pollution in the Tisza River Watershed	Romania, Ukraine	BACIU, Babes-Bolyai University Institute of Environmental Geochemistry
984481	Multi Year Project	Nanostructured Materials for the Catalytic Abatement of Chemical Warfare Agents	Italy, Ukraine	Institute of Molecular Sciences and Technology, National Research Council (CNR) National University of Life and Envi-ronmental Sciences of Ukraine (Crimean State Medical University) (Nano-SISTEMI Interdisciplinary Centre, Uni-versity of Eastern Piedmont ¨A. Avogadro¨)
984536	Multi Year Project	Thermoelectric Materials and Devices for Increasing of Energy Saving and Security	Turkey, Ukraine	Gazi University Vasyl Stefanyk Precarpathian National University
984544	Multi Year Project	Uncooled Terahertz Arrays for Imaging Explosives	Spain, Ukraine	Universidad Autonoma de Madrid Ukrainian Academy of Sciences (Brookhaven National Laboratory)
984585	Multi Year Project	Remediation of Hydrocarbon Polluted Military Site in Ukraine (Unit A-3482, Kiev)	France, Ukraine	Bureau de Recherches Géologiques et Minières (BRGM) Ministry of Defence, Ecological Unit
984605	Multi Year Project	A New Method of Detection of Fast Neutrons to Control Illegal Transport of Nuclear Materials (Short Title : Fast Neutron Detector)	France, Ukraine	DETEC-Europe Institute of Scintillation Materials (ISMA) of National Academy of Sciences of Ukraine
984617	Multi Year Project	Nanostructured metal-Semiconductor Thin films for Efficient Solar Harvesting	US, Ukraine	University of Colorado National Academy of Sciences Taras Shevchenko National University of Kyiv

Project Number	Mechanism	Title	Countries	Institutions
984637	Multi Year Project	Development of Optical Bio-Sensors for Detection of Bio-Toxins	Hungary, Ukraine, Israel, France, UK	Central Environmental and Food Science Research Institute (CFRI) National University of Life and Environmental Sciences of Ukraine (NULES) Weizmann Institute of Science, Department of Materials and Interfaces (WI DMI) Université de Perpignan Laboratoire IMAgES (UP IMAgES)
984639	Multi Year Project	Development of a Superselective Adsorbent against CBRN Agents	US, Ukraine	East Tennessee State University Institute of Bioorganic Chemistry and Petrochemistry (Institute for Safety Problems of Nuclear Power Plants)
984649	Multi Year Project	New Dosimetry for the Triage of Radiation Exposure	Turkey, Israel, Ukraine	Cukurova University Lviv Polytechnic National University Sheba Medical Centre
984655	Multi Year Project	Hand-Held Gamma Detector Based on High-Pressure Xenon Gas	US, Ukraine	Brookhaven National Laboratory Kharkov Institute of Physics and Technology
984684	Multi Year Project	Remote Sensing in the Nearshore Zone for Improved Homeland Security	US, Ukraine	University of Washington Kharkiv National Academy of Sciencs of Ukraine
984702	Multi Year Project	Metal Nanocrystals for Highly Sensitive Detection of Biochemical Agents	Estonia, Ukraine	Institute of Physics University of Tartu (IPUT) Institute of Physics of NAS of Ukraine (IP-NASU)
984705	Multi Year Project	A Sensor Network for the Localization and Identification of Radiation Sources	Greece, Ukraine	Hellenic Army Academy (HAA) V.E. Lashkaryov Institute of Semiconductor Physics of the National Academy of Sciences of Ukraine (ISP-NASU)
984735	Multi Year Project	Novel Nanostructures for Security Applications	France, Ukraine, Sweden	Centre Tecnològic de Telecomunicacions de Catalunya Chonbuk National University National Academy of Sciences
984809	Multi Year Project	Compact Sensor System for Unmanned Aerial Vehicles	Spain, South Korea, Ukraine	Gazi University Vasyl Stefanyk Precarpathian National University
984834	Multi Year Project	Fighting Maritime Corrosion and Biofouling with Task-specific Ionic Compounds	Belgium, Ukraine	Antwerp Maritime Academy Inst. of Molecular Biology and Genetics, National Academy of Sciences of Ukraine
984856	Multi Year Project	Ultra-Fast Adaptive Optical Elements	US, Ukraine, Israel	University of Colorado at Colorado Springs National Academy of Sciences Jerusalem College of Technology
984877	Multi Year Project	Modelling and Mitigation of Social Disasters Caused by Catastrophes and Terrorism	Romania, Ukraine, Moldova	Romanian Academy of Science National Technical University of Ukraine Academy of Sciences of Moldova

Project Number	Mechanism	Title	Countries	Institutions
984903	Advanced Research Workshop	International Expert Support for Ukraine's Security and Defence Review	Estonia, Ukraine	International Centre for Defence and Security Razumkov Centre
984906	Multi Year Project	Redefined Chernobyl Confinement Model – Assisting Ukraine in Managing the Radioactive Dust Disturbances and Leaks and Protecting their Workers	Germany, Ukraine	Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH Institute of EngineeringThermophysics (IETP), NAS of Ukraine
984910	Advanced Research Workshop	Nanomaterials for Security	Slovenia, Ukraine	J. Stefan Institute Bogolyubov Institute of Theoretical Physics
984918	Advanced Research Workshop	Best Practices and Lessons Learned in Conflict Management: NATO, OSCE, EU and Civil Society	Slovakia, Ukraine	Research Centre of the Slovak Foreign Policy Association Foreign Policy Research Institute
984957	Multi Year Project	Icing Mitigation Studies and Technology with Applications to Security Systems	Canada, Ukraine, Belgium	York University Odessa I.I. Mechnikov National University Vladimir Martynovskiy Institute of Refrigeration, Cryotechnology and Ecoenergetics Université Libre de Bruxelles
984958	Multi Year Project	New Sensor Materials and Detectors for Ionizing Radiation Detection	US, Ukraine, France	Lawrence Berkeley National Laboratory Institute for Scintillation Materials NAS of Ukraine Institute of Light and Matter, UMR5306 CNRS, University Claude Bernard Lyon 1
984967	Advanced Research Workshop	Hands On Cyber Defence Training Course for System/ Network Administrators of Ukraine	Turkey, Ukraine	Middle East Technical University (METU) Security Service of Ukraine
984985	Advanced Research Workshop	Addressing Security Risks at the Ukrainian Border through Best Practices and Good Governance - Sources and Counter Measures	Poland, Ukraine	Kosciuszko Institute Ukrainian Institute for Public Policy
984992	Multi Year Project	Long-Range Stand-Off Microwaves Radar for Personnel Protection	Canada, Ukraine	McMaster University Kiev Polytechnic Institute (KPI)
985014	Multi Year Project	Holographic and Impulse Subsurface Radar for Landmine and IED Detection	Italy, Ukraine, US	University of Florence Usikov Institute for Radiophysics and Electronics Franklin & Marshall College
985015	Advanced Research Workshop	Border Security Challenges in Eastern Europe: Lessons for Allies and Partners	Poland, Rep. of Moldova, Ukraine	German Marshall Fund of the United States Foreign Policy Association Institute of World Policy
985024	Multi Year Project	Support to Humanitarian Demining in Ukraine	NSPA, Ukraine	NATO Support Agency State Emergency Service of Ukraine (SESU)

Project Number	Mechanism	Title	Countries	Institutions
985055	Multi Year Project	Development of novel methods for the prevention of pipeline failures with security implications	Italy, Ukraine	Department of Civil and Environmental Engineering, Politecnico di Milano Karpenko Physico-Mechanical Institute of the National Academy of Sciences of Ukraine
985066	Advanced Research Workshop	The Military Conflict in Ukraine and UN Security Council Resolution 1325	Italy, Ukraine	Instituto Affari Internazionali (IAI) Democracy Development Centre

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The NATO Science for Peace and Security Programme

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