



SCIENCE & TECHNOLOGY ORGANIZATION

COLLABORATION SUPPORT OFFICE

SPECIALISTS' MEETING

MISSION ASSURANCE FOR AUTONOMOUS UNMANNED SYSTEMS

IST-166

organised by the

Information Systems and Technology Panel

to be held at

**The Military Academy Research Center (CINAMIL),
Campus Amadora, Lisbon, Portugal**

Tuesday 16 October - Wednesday 17 October 2018

This Specialists' Meeting is open to NATO nations, PfP nations, Mediterranean Dialogue, ICI nations and Global Partners



ENROLMENTS:

Participants are requested to enrol on-line

<https://events.sto.nato.int>

Deadline for enrolments is 1 October

There are no conference fees.

If you are unable to enrol via the internet, please contact the IST Panel Assistant at: aysegul.apaydin@csso.nato.int



Background

Information Systems Technology Panel (IST) is one of the seven Panels whose role it is to implement, on behalf of the Science & Technology Board, the STO Mission with respect to Information Systems Technology. The advancement and exchange of techniques and technologies to provide timely, affordable, dependable, secure and relevant information to war fighters, planners and strategists, as well as enabling technologies for modelling, simulation, and training are the focus of this Panel. The Information Systems Technology Panel covers the fields of Information Warfare and Assurance, Information and Knowledge Management, Communications and Networks and Architecture and Enabling Technologies.

Theme - Objectives –Topics

Advances in autonomous unmanned systems provide an increasing number of challenges for both the operational and research communities. Careful consideration is needed in the command and control of the integrated man and machine team when considering the communication systems and the dependencies across the distributed and complex operational environments. The traditional understanding of cyber network operations will extend beyond the physical connectivity into the electromagnetic spectrum. There will be an increasing number of access points for nefarious actors to corrupt collection integrity, inject false data or modify data with the intent to deceive or deny the mission. Trends in the commercial sector will spill over into the defense systems and we will rely more heavily on infrastructure as a service and security as a service as cyber reach continues to extend from wired systems to systems connected through wireless communications.

This growing complexity makes it even more pressing to develop a holistic approach to security to ensure that adequate protection is integrated in the development of new capabilities from the early design stages. Experts need to be involved to help security researchers understand the breadth and depth of new security risks. Novel security solutions will ensure the success of the future integration of man and machine across sea, land, air and space systems.

This specialist meeting will focus on the multi-disciplinary aspect of the problem of providing mission assurance for autonomous unmanned systems. Understanding the role and the potential of unmanned autonomous systems in future missions is critical to identify new cyber security risks and develop novel methods to address them. A non-exhaustive list of suggested topics is presented below:

TOPICS:

Mission Concepts Integrating Unmanned and Autonomous Systems
Unmanned and Autonomous System Platforms
Risk Management and Risk Assessment for Autonomous Systems
Validation and Verification for Autonomous Vehicles and Software
Enabling Technology for Autonomy

Collaboration Support Office - Point of Contact

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Science and Technology Organization in NATO

In NATO, Science & Technology (S&T) is defined as the selective and rigorous generation and application of state-of-the-art, validated knowledge for defence and security purposes. S&T activities embrace scientific research, technology development, transition, application and field-testing, experimentation and a range of related scientific activities that include systems engineering, operational research and analysis, synthesis, integration and validation of knowledge derived through the scientific method.

In NATO, S&T is addressed using different business models:

- The Collaborative business model where NATO provides a forum where NATO Nations and partner Nations elect to use their national resources to define, conduct and promote cooperative research and information exchange.
- The In-House delivery business model where S&T activities are conducted in a NATO dedicated executive body, having its own personnel, capabilities and infrastructure.

The Science and Technology Organization - STO

The mission of the NATO STO is to help position the Nations' and NATO's S&T investments as a strategic enabler of the knowledge and technology advantage for the defence and security posture of NATO Nations and partner Nations, by:

- Conducting and promoting S&T activities that augment and leverage the capabilities and programmes of the Alliance, of the NATO Nations and the partner Nations, in support of NATO's objectives;
- Contributing to NATO's ability to enable and influence security- and defence-related capability development and threat mitigation in NATO Nations and partner Nations, in accordance with NATO policies;
- Supporting decision-making in the NATO Nations and NATO.

Acknowledgements

We wish to thank our hosts from the Portuguese Army, and in particular the Military Academy Research Center (CINAMIL), Campus Amadora, for organising and hosting this event in their facilities and their lovely city.



<http://www.sto.nato.int>



IST-166 Specialists' Meeting on Mission Assurance for Autonomous Unmanned Systems Programme

Tuesday 16 October 2018

09:00 REGISTRATION

09:30 OPENING CEREMONY

Host Welcome Speech: Prof. José BORGES, President of the Executive Board, Military Academy Research Center
Introduction: Dr.Eng. Michael WUNDER, Chairman IST Panel
Introduction to the Specialists' Meeting: Dr. Misty BLOWERS, USA
Presentation of IST-164: Dr. Federico MANCINI, NOR

10:30 KEYNOTE SPEECH 1:

Current Challenges for Autonomous Robot Systems
by Prof. Pedro LIMA, Institute for Systems and Robotics (ISR), Associate Professor at Instituto Superior Técnico (IST), University of Lisbon, PRT

11:15 BREAK

SESSION 1 – INTELLIGENCE IN AUTONOMY

11:45 1 Autonomous and Dependable Multi-Agent Systems for the Mission Planning of Multi UAV Surveillance Missions
by Domenico PASCARELLA, Gabriella GIGANTE, Salvatore LUONGO, CIRA-Italian Aerospace Research Centre, Salvatore VENTICINQUE, Università degli Studi della Campania “Luigi Vanvitelli”, School of Polytechnic and Basic Sciences, ITA

12:05 2 Assuring Autonomy

by Ramesh BHARADWAJ, Ira MOSKOWITZ, NRL, USA

12:25 Panel Discussion

12:45 LUNCH

14:00 KEYNOTE SPEECH 2:

Blockchain as a New Framework for Unmanned System Swarms
by Dr. Misty BLOWERS, Corporate Director Strategic Development at Peraton, USA

SESSION 2 – SECURING AUTONOMOUS PLATFORMS

14:45 3 Distributed Integrated Modular Avionics
by Miguel BARROS, José NEVES, GMV, PRT, Marco ORTIZ, Sérgio PENNA, José PARIZI, EMBRAER, BRZ

15:05 BREAK

15:35 4 Towards a Trustworthy Foundation for Assured UAVs

by Thomas MACKLIN, Paul WEST, NRL, USA

15:55 Panel Discussion (until 16:15)

19:00 HOST NATION RECEPTION (for all attendees)

Wednesday 17 October 2018

09:00 KEYNOTE SPEECH 3:

Gaps in the Basic Research Needed for Distributed Autonomous Vehicles
by Frederick LEVE, Air Force Office of Scientific Research (AFOSR), USA

SESSION 3 – RISK ASSESSMENT FOR PLATFORMS AND MISSIONS

09:45 5 Unmanned Aircraft Systems Risk Assessment Review of Existing Tools and New Results
by João Vieira CAETANO, Portuguese Military University Institute, Diogo DUARTE, Portuguese Air Force Airworthiness Certification Dept., Teresa CABRAL, Portuguese Military Airworthiness Authority, PRT, Simon PLACE, Pete McCARTHY, Cranfield University, GBR

10:20 BREAK

10:50 6 Managing Adversity Risks for Non-anthropogenic Systems
by Ian BRYANT, Tim WATSON, Carsten MAPLE, University of Warwick, GBR

11:10 7 Risk Management Framework: Qualitative Risk Assessment through Risk Scenario Analysis
by John W. PIPER, Principal, Bearing LLC, USA

11:30 Panel Discussion

12:00 LUNCH

SESSION 4 – MISSION CONCEPTS AND MODELLING

13:15 8 A Reference Model for Unmanned Systems
by Mario MARQUES, V. LOBO, CINAV, Portuguese Navy, PRT

13:35 9 Mission Oriented Optimization
by Gustav ANDERSON, Lockheed-Martin Advanced Technology Lab., USA

13:55 10 Base Protection with Autonomous Systems
by Jens Inge HYNDØY, Idar DYRDAL, Solveig BRUVOLL, FFI, NOR

14:15 Panel Discussion

14:40 BREAK

15:10 DISCUSSIONS AND CONCLUDING REMARKS

16:00 END of MEETING