



SCIENCE AND TECHNOLOGY ORGANIZATION  
INFORMATION SYSTEMS TECHNOLOGY PANEL



## CALL FOR PAPERS / PARTICIPATION

IST-127/RSM-003 Specialists' Meeting

“INTELLIGENCE & AUTONOMY IN ROBOTICS”

to be held in

**Bonn, Germany**

**25 – 27 October 2016**



**DEADLINE FOR RECEIPT OF EXTENDED ABSTRACTS:**

**11. April 2016**

*(US Authors please check Annex A of this document)*

**This Specialists' Meeting is NATO UNCLASSIFIED open to PfP nations**

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# The NATO Science and Technology Organization

Science & Technology (S&T) in the NATO context 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, namely a 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, and secondly an 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 mission of the NATO Science & Technology Organization (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, and 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.

The total spectrum of this collaborative effort is addressed by six Technical Panels who manage a wide range of scientific research activities, a Group specialising in modelling and simulation, plus a Committee dedicated to supporting the information management needs of the organization:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS System Analysis and Studies Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These Panels and Groups are the power-house of the collaborative model and are made up of national representatives as well as recognised world-class scientists, engineers and information specialists. In addition to providing critical technical oversight, they also provide a communication link to military users and other NATO bodies.

The scientific and technological work is carried out by Technical Teams, created under one or more of these eight bodies, for specific research activities which have a defined duration. These research activities can take a variety of forms, including Task Groups, Workshops, Symposia, Specialists' Meetings, Lecture Series and Technical Courses

## **The Information Systems Technology (IST) Panel**

The mission of the Information Systems Technology (IST) Panel is to implement, on behalf of the S&T 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 (IST)** covers the fields of:

- (a) Information Warfare and Assurance,
- (b) Architecture and Intelligent Information Systems,
- (c) Communications and Networks,

## TECHNICAL PROGRAMME COMMITTEE

### Programme Chairman

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## General Scope of the Meeting

Over the last decade significant progress has been achieved in the autonomy of mobile robots and unmanned vehicles. Due to advances in 3D sensing, motion planning, and navigation safe and reliable operation of autonomous military trucks will very soon be possible. Current research on semantic environment perception, mobile manipulation, and mission planning will enable mobile robots to perform task autonomously in the future that can only be carried out using tele-operation today, like e.g. EOD and reconnaissance missions with robots. It is also foreseeable that future autonomous systems will directly interact and cooperate with the soldiers in the field, e.g. for carrying equipment or during search and rescue missions. However, to achieve these goals the algorithms devised for the intelligence and autonomy of the systems have to address requirements specific to the military that are barely addressed by the main body of current research. Military robots have to operate in highly unstructured and hostile outdoor and off-road environments, raising the need to gain full situational awareness in 3D in real-time for autonomous navigation and task execution. They have to take military rules and tactics into account while performing their missions and they have to interact and cooperate with each other and the soldiers in the field. Therefore, specialized knowledge representations have to be developed that not only allow integrating the robots uncertain sensor information but also enable mission planning on a symbolic level. The representations also have to facilitate the direct interaction of robots and soldiers as well as the easy integration with modern command systems. To strengthen and speed-up the development of intelligent autonomous military robot systems a close collaboration between researchers of different NATO nations is necessary, especially in order to keep upcoming differing solutions compatible and interoperable.

## Objectives

The aim of this specialist meeting is to bring together specialists working on the different aspects of intelligent autonomous military robot systems, in order to discuss current trends and solutions with special emphasis on the military application domain.

The specialists' meeting will be organized as a workshop consisting of invited talks and several sessions with oral as well as poster presentations and plenty of time for discussions.

Presentations are invited in the areas of:

- Environment perception and autonomous navigation
- Robot motion planning and mobile manipulation
- Mission planning and Knowledge representation
- Networks robots and multi robot coordination
- Soldier robot cooperation
- Application scenarios
- NEC, C2, and interoperability aspects

## Background and Justification (Relevance to NATO)

The general report of the NATO Science and Technology Committee 175 STC 07 Transforming the Future of Warfare: Network-enabled Capabilities and Unmanned Systems stated already in 2007

that “unmanned systems are rapidly becoming an increasingly important part of the armed forces. [...]

However, the guidance of unmanned ground vehicles becomes problematic when operating in dense urban landscape where concrete and steel buildings impede radio communications”.

The report mainly suggested enhancing the communication capabilities of the systems to tackle this problem. Alternatively, more intelligence and autonomy of the vehicles would offer an opportunity to overcome the strong dependence on reliable communication links. While large companies like Google, VW, Mercedes etc. forcefully develop autonomous cars and intelligent driver assistance functions at the moment, the R&D activities on autonomous military vehicles suffers from a national fragmentation of the research community. The main goal of the proposed activity is to consolidate the NATO-wide knowledge in the field of intelligent and autonomous robots, identify the gap between civilian solutions and military needs and pursue the transfer of the most promising technologies and applications to the military domain.

## SUBMISSION INSTRUCTIONS

The specialists' meeting will offer plenary talks, oral paper presentations and potentially poster presentations as well as demonstrations. For each kind of contribution, authors are required to submit a two-page extended abstract or demonstration description for review. This abstract/description should provide an explicit statement of the content that will be contained in the contribution and its relevance to the Specialists' Meeting. The first page of the abstract/description must include the title of the proposed contribution followed by the full name of the principle author and co-authors with the respective e-mail addresses. This will assist the administrative process and ensure further communication. Authors will be notified if the abstract/description has been accepted. Authors of abstracts which are candidates for an oral paper presentation have to submit a full paper. Instructions for the full paper will be provided together with the acceptance notification. Full papers are optional for poster presentations and demonstrations.

Authors are allowed to submit multiple paper abstracts and demonstration descriptions.

Submissions are solicited on any of the listed topics, or on any other topic that illuminates any of the themes. An indication of which Specialists' Meeting topic the paper would logically fit would be of assistance to the Technical Programme Committee, who will adjudicate on the papers selected. In addition to this, we kindly ask each author to fill in a Questionnaire (Part I and II) that you will find in **Annex B**. This will give the maximum amount of information on the status of feasibility of any project concerned, so that the Technical Programme Committee is able to make clear and complete evaluation of the appropriateness and timely interest of the proposed contribution.

It is the responsibility of the author to ensure that the paper/abstract received the necessary clearances before it is forwarded. Please allow sufficient time for the clearance to be issued before deadline. In this case, the NATO classification for the Specialists' Meeting has been declared as: NATO UNCLASSIFIED open to Pfp Nations from Austria, Finland, Ireland, Sweden, Switzerland and Ukraine.

**OPTION:** Authors from the United States must comply with US procedures. (*Refer to the Instructions in Annex A*)

Authors submitting paper abstracts and demonstration descriptions should ensure that financial support for attending the Symposium will be available.

Please send an electronic copy of the extended abstract and demonstration descriptions together with the completed Questionnaire (Parts I and II) herewith attached (**Annex B**) to the Technical Programme Committee Chairman ([dirk.schulz@fkie.fraunhofer.de](mailto:dirk.schulz@fkie.fraunhofer.de)) with a courtesy copy to the IST Panel Assistant ([aysegul.apaydin@cs0.nato.int](mailto:aysegul.apaydin@cs0.nato.int)) early enough to reach them by **11. Apr. 2016**.

## IMPORTANT DATES

- 11. Apr. 2016**
  - Submission of papers/extended-abstracts
- 6. Jun. 2016**
  - Notification to authors by Chairman of Technical Programme Committee
  - Authors to receive full «Instructions to Authors» package from CSO
  - Authors to start national procedure to obtain the «Presentation/Publication Release and Clearance Certificate (Form 13e)  
(*this document will be attached to the "Instructions to Authors" document*)
- 12 Sep. 2016**
  - Submission of «Presentation/Publication Release and Clearance Certificate» (Form 13e) to CSO
  - Submission of manuscripts to CSO (electronic by e-mail (Word & PDF))

**3. Oct. 2016**

- Submission of the Oral Presentation (by e-mail to CSO)

## **PAPERS and PRESENTATIONS**

Approximately 15 full papers will be presented at the plenary sessions, each author being allocated 25 minutes, with usually twenty minutes for the presentation of their paper and five minutes for discussion. All presented papers will be published. They should be written and presented in English. Authors whose extended abstracts are accepted will be asked to provide a full version of their paper electronically by e-mail. Detailed instructions (Authors Package) and necessary material will be sent to each "Lead" author of papers, around 6. June 2016 with the acceptance notification.

## **GENERAL INFORMATION**

The German authorities have graciously invited the IST Panel to hold this event in their country. The audience will include several STO/IST Panel Members, experts from NATO nations, as well as potential participants from the Partner for Peace (PfP) nations listed above. The meeting will be at NATO/PfP UNCLASSIFIED level.

This meeting will bring together both military and civilian users, practitioners, researchers and technologists, with big picture ideals blended with appropriate level of detail. It will also feature invited presentations and keynote speeches. It is also planned to have a panel discussion.

A Meeting Announcement as well as a General Information Package giving further details on the meeting site where the meeting will take place, including Hotel Booking Forms will be available from the CSO by 15 Jul 2016.

Authors will be notified by the IST Panel Office of the opening of on line enrolment on the CSO web site ([www.cso.nato.int](http://www.cso.nato.int)). It is mandatory for all participants to enrol on this website using the reference IST-127 to get access to the meeting site. A General Information Package (GIP) will also be sent once the enrolment is validated, giving further details about the meeting venue, hotel bookings and other necessary information.

## **PUBLICATION OF MEETING PROCEEDINGS**

Complete instructions will be sent by the IST Panel Assistant to the lead authors of the selected papers who will be providing a full paper. The Guidelines for authors will detail all requirements and deadlines for the preparation of the final manuscripts and presentations.

All authors will need to provide CSO with a final version of their Paper by **12 Sep 2016**, together with the Presentation/Publication Release and Clearance Certificate (Form 13e). Please be reminded that all papers must be written and presented in English.

A week before the meeting, CSO will pre-release the papers on the CSO website. These papers will be available under a login and password which will be provided by the IST Panel Office.

The final publication (Meeting Proceedings) will be at a URL address which will be given later, together with a login and password. This will represent the official reference of the Meeting Proceedings of this Symposium including the presentations, papers, posters (if any), demonstration videos (if any), an Executive Summary, abstract and the TER (Technical Evaluation Report). Please take note that CSO reserves the right to print in the Proceedings any paper or material presented at the meeting.

Any questions on the technical aspects of the scientific programme or the contents of papers should be addressed to the Programme Committee Chairman or members.

Questions on the administrative aspects of this Symposium or requests for further information on STO

activities should be addressed to the IST Panel Office:

**Attn: Mrs Aysegül APAYDIN**

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**SECURITY LEVEL AND CLEARANCE FOR PRESENTATIONS AND PAPERS**

This Specialists' Meeting is classified NATO UNCLASSIFIED open to Austria, Finland, Ireland, Sweden, Switzerland and Ukraine. It is the responsibility of each contributor to fulfil the publication release and clearance requirements of his/her organization/company and country to obtain clearance of abstracts and papers as needed. An official clearance is mandatory in the United States and there may also be a requirement in other countries to obtain clearance for unclassified as well as classified papers. For further information, authors should contact the appropriate Programme Committee Member listed in this document or their National STO Coordinator. To assist with this process, the IST Panel Assistant will send further detailed instructions to the authors of the papers selected.

Authors of contributions selected for presentation will not be financially supported by this organisation. You are responsible for your own hotel and travel reservations based on suggestions given in the General Information Package which we will provide. Expenses for travel and per diem costs are the responsibility of each author's organisation and nation.

Thank you for your contributions which are very much appreciated by the NATO community.

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*From the USA or CANADA:*

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PSC 116  
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**SPECIAL NOTICE TO U.S. AUTHORS  
AND  
NON-U.S. CITIZENS AFFILIATED WITH U.S. ORGANISATIONS**

Ref.: Specialists' Meeting (IST-127-RSM-003) on "INTELLIGENCE & AUTONOMY IN ROBOTICS"  
to be held in Bonn, Germany, 25 – 27 Oct. 2016

**ABSTRACTS OF PAPERS FROM THE U.S. MUST BE SENT ONLY TO THE  
FOLLOWING P.O.C.:**

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- 1. ALL U.S. AUTHORS MUST SUBMIT ONE ELECTRONIC COPY TO THIS P.O.C. BY  
4 Apr 2016**

**THE P.O.C. WILL FORWARD ALL US ABSTRACTS AS REQUIRED BY THE  
TECHNICAL PROGRAM COMMITTEE.**

IN ADDITION TO THEIR ABSTRACT, ALL U.S. AUTHORS MUST PROVIDE:

- A) A CERTIFICATION (CAN BE SIGNED BY THE AUTHOR) THAT THERE ARE NO PROPRIETARY OR COPYRIGHT LIMITATIONS;
- B) INTERNAL DOCUMENTATION FROM THEIR LOCAL PUBLIC AFFAIRS OR FOREIGN DISCLOSURE OFFICE (OR EQUIVALENT) THAT CLEARLY SHOWS:
  - TITLE OF THE PAPER OR PRESENTATION
  - LEVEL OF CLEARANCE (I.E. APPROVED FOR PUBLIC RELEASE)
  - NAME, TITLE AND ORGANIZATION OF THE APPROVAL AUTHORITY
  -
- C) FULL DETAILS OF AUTHORS

NOTE THAT ONLY COMPLETE PACKAGES (ABSTRACTS + ITEMS LISTED ABOVE) WILL BE ACCEPTED BY THE U.S. POC. AFTER REVIEW AND APPROVAL, THE U.S. POC WILL FORWARD ALL U.S. ABSTRACTS TO THE IST PANEL OFFICE, WHO WILL SEND THEM TO THE PROGRAMME COMMITTEE. U.S. AUTHORS ARE ENCOURAGED TO ADDRESS QUESTIONS AND CONCERNS TO THE POC AS EARLY AS POSSIBLE. DELAYS IN MEETING DEADLINES WILL IMPACT THE TIMELY SUBMISSION OF YOUR ABSTRACT.



**QUESTIONNAIRE**

For consideration of a paper submitted for the Information Systems Technology Panel Specialists' Meeting on:

**INTELLIGENCE & AUTONOMY IN ROBOTICS****(IST-127/RSM-003)****Bonn, Germany, 25 – 27 Oct. 2016****Please attach a copy of this Questionnaire to each copy of abstract**

On each Abstract, authors should be listed in the order they will appear on the programme. Unless specified otherwise, the first listed author will be presumed to be the **LEAD AUTHOR** having the major responsibility regarding the content of the paper)

*(A Word copy of the questionnaire is attached to this PDF file)*

**PART I****TITLE OF PAPER:****What is the nature of the paper/presentation?**

1. *Research note*
2. *Position paper*
3. *Field report*
4. *Survey article*

  
  
  

**Symposium Topic Areas:** *(please click 1 or several boxes as appropriate)*

1. **INTELLIGENCE & AUTONOMY IN ROBOTICS**  
*System aspects and/or description*
2. **INTELLIGENCE & AUTONOMY IN ROBOTICS**  
*Algorithms and/or methodologies*
3. **INTELLIGENCE & AUTONOMY IN ROBOTICS**  
*HRI aspect*
4. **INTELLIGENCE & AUTONOMY IN ROBOTICS**  
*Applications, Missions and Requirements*

**Please provide one or two sentences in response to the following questions:**

- 1) What is the operational relevance of your technical work for defence?
  
  
  
  
  
  
  
  
  
  
  
- 2) What do you believe is a new idea or development in your technical work?

**PART II: DETAILS OF AUTHORS**

**CO-AUTHORED PAPERS:** Authors should be listed in the order they will appear on the program. Unless specified otherwise, the first listed author will be presumed to be the **LEAD AUTHOR** (i.e. the author having the major responsibility regarding the content of the paper).

**TITLE OF PAPER:**

**AUTHORSHIP** *(Please list full names of authors and affiliations):*

**CONCISE BUSINESS MAILING ADDRESS** *(include title (Mr, Mrs, Dr, etc.) full name & zip code)*

<p><b><u>Lead Author:</u></b></p>
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**Position in organisation:**

**Telephone: Country code:**

*Area/town code:*

**Number:**

**Fax No: Country code:**

*Area/town code:*

**Number:**

**E-mail:**