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HUMAN FACTORS & MEDICINE (HFM) PANEL

CALL FOR PAPERS

HFM-RSY-361 Symposium on

Mitigating and Responding to Cognitive Warfare

To be held in
Madrid, Spain
16-17 October 2023

For information, please contact:

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This Symposium is open to
NATO Nations, STO EOP, GP, MD, PfP
and will be conducted at a Public Releasable level.

DEADLINE FOR RECEIPT OF ABSTRACTS:

17th February 2023 for US Authors
03rd March 2023 for Authors from other Nations

**PUBLIC RELEASABLE****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. This is achieved by conducting and promoting S&T activities that augment and leverage the capabilities and programs 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 and one Group who manage a wide range of scientific research activities:

- 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 Group are the power-house of the collaborative model and are made up of national representatives as well as recognized 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 seven 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 Human Factors and Medicine Panel (HFM) is part of the Science & Technology Organization, Collaboration and Support Office (STO-CSO): Consult our STO/CSO website at <http://www.sto.nato.int>

The HFM Panel covers the fields of two complementary domains, which are represented in the two 'Area Committees':

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- A) The **Health, Medicine and Protection (HMP) Area** provides the scientific basis for establishing an operationally fit and healthy force, restoring health, minimizing disease and injury, optimizing human protection, sustainability and survivability. This encompasses research in the field of military medicine, physiology, psychology and human protection technology. Areas of interest include, among others, medical diagnosis, prevention, treatment and evacuation. HMP also focuses on enhancing human protection research on physiological and physical influences, e.g., of cold, heat, air pressure, noise, vibration, ionizing and non-ionizing radiation, acceleration, motion, biological and chemical effects on the human body, and developing appropriate countermeasures.
- B) The **Human Systems and Behaviour (HSB) Area** provides the scientific basis and explores new technology for optimizing the performance of individuals, teams and organizations and their interaction with socio-technical systems to achieve highly effective mission performance. This encompasses research in the fields of human factors, human systems integration as well as cognitive, psycho-social, organizational and cultural aspects in military action. Contributions on Human Systems Integration cover complexity, total life-cycle affordability, human error and fatigue management, intelligent agents, human cognitive and physical resources management, anthropometry, human-machine interfaces, communication and teamwork, performance assessment, enhancement and aiding, training and function allocation in (semi)automated systems. Contributions on individual and team readiness cover values and ethics, leadership, multi-national operations, human enhancement and coping with mental, cognitive and physical demands on the individual. Contributions on organizational effectiveness encompass human resource management, training, interoperability, shared decision-making, synchronized situational awareness, resilience, understanding terrorism, psychological operations and coping with new demands on military organizations.

PUBLIC RELEASABLE**THE HUMAN FACTOR AND MEDICINE (HFM) RESEARCH SYMPOSIUM – 361
on Mitigating and Responding to Cognitive Warfare**

The HFM-361 Research Symposium aims to increase the understanding of Cognitive Warfare (CogWar) and its effects. This will lead to effective prevention and mitigation strategies, and countermeasures to increase cognitive security among nations, and within the NATO Alliance.

SYMPOSIUM INFORMATION**A. BACKGROUND**

In a more uncertain world responding to and mitigating sub-threshold threats that simultaneously impact military and civilian domains requires a stronger handshake between defence and security. Hybrid methods, where adversarial activities occur at once and combine propaganda, deception, sabotage, disinformation/misinformation, as well as other non-military sub-threshold tactics have been used throughout the history of warfare to undermine opponents from within. Today, technological advancements and their democratisation has meant that access, speed of delivery, reach, obfuscation, and dual-use capabilities are available to both state and non-state actors. When traditional and once mastered activities are combined with modern technologies, advancement in science and innovative techniques for delivery, then the ability and capability of cognitive effects, some of which were once inconceivable, or just conceptual, to become tools in the warfighting toolbox is feasible. Such effects can be applied at any time, irrespective of the conflict spectrum or internationally recognised definitions of 'war', 'conflict' or 'crisis'. This is operationally apposite for NATO as they fall within, as well as challenge the Alliance's three core tasks: deterrence and defence, crisis prevention and management, and cooperative security.

The NATO Summit in Brussels in 2021 stated: "We are increasingly confronted by cyber, hybrid, and other asymmetric threats, including disinformation campaigns, and by the malicious use of ever-more sophisticated emerging and disruptive technologies [...]. Russia and China are fully engaged in this type of Warfare". Further, the Strategic Concept issued during the NATO Summit 2022 in Madrid, reiterates this earlier statement: "Authoritarian actors challenge our interests, values, and democratic way of life. [...]. They interfere in our democratic processes and institutions and target the security of our citizens through hybrid tactics, both directly and through proxies. They conduct malicious activities in cyberspace and space, promote disinformation campaigns, instrumentalise migration, manipulate energy supplies and employ economic coercion. [...]. The Peoples Republic of China's malicious hybrid and cyber operations and its confrontational rhetoric and disinformation target Allies and harm Alliance security. [...]. The deepening strategic partnership between the Peoples Republic of China and the Russian Federation and their mutually reinforcing attempts to undercut the rules-based international order run counter to our values and interests."

Cognitive Superiority is the state of possessing and applying faster, deeper, broader and / or more effective military thinking and understanding than adversaries, and pursued through better Situational Awareness (SA), data management and exploitation, appropriate human or machine cognitive processes, and the shaping and contesting of adversarial cognitive actions. The resulting effect of having cognitive superiority enables the actor to hold the information initiative. As we witnessed in the build-up the Russian invasion of Ukraine, having this advantage placed the perpetrator on the back foot and led to the quick western response. Having the information advantage allowed for initiative and activities that framed the conflict in such a way that Russia had no plausible cause to start.

Within this context lies Cognitive Warfare (CogWar), considered as an emerging multi-domain battlefield to affect behaviour through the protection or influence of cognition to gain advantage over an adversary. By manipulating human understanding, perspectives and behaviours, military, political, or social environments can be shaped in favour of one's strategic objectives.

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CogWar focuses on altering or affecting cognitive processes and therefore actions. Boosted by digital ecosystems, new technologies and advances in neuroscience that enable novel Tactics, Techniques and Procedures (TTP), CogWar capabilities are likely to expand even further. TTPs will become more sophisticated, intrusive, illusive, and distributed due to the multiplier effect of Artificial Intelligence (AI), Machine Learning (ML) algorithms and how the Internet of Things (IoT) - where everything in the physical life has a digital imprint - will greatly influence warfare.

CogWar targets trust (human to human, human to machine [bi-directional], and machine-human-machine-...). Misinformation, disinformation, and false information campaigns undermine human decision-making by corroding trust at all levels of our modern socio-technical cyber-physical systems: between individuals, within societies, and amongst nations. The online Social Media war presents a complex, psycho-social threat in the Information Environment (IE) that is exacerbated by state and non-state actors including Social Media companies themselves, to deliver cognitive effects that exploit such facets as cognitive bias, an innate human limitation (that we now build into our machines), or psychological/physiological vulnerabilities. Such acts of aggression that target the “non-observable” cognitive layer (as described in several doctrines AJP-3.10¹, AJP-10², AJP-3.10.1³) in the IE deliver effects that may only become visible once the damage has already been done. It is therefore necessary that we increase our understanding of these threats, to assist warfighters, decision makers, and civilian actors in an ever more complex operating environment.

Considering the potential opportunities, threats, implications, and impact of CogWar on NATO it is imperative that NATO develops and maintains a collective capacity to a) describe and develop legal & ethical procedures to act on or react to CogWar, and b) obtain the capabilities to sense, sense-make, and act to resist, mitigate and counter CogWar on its member countries.

Several additional NATO initiatives within ACT, and STO Panels (IST-195, IST ET-123, IST ET-117, IST-177, SAS-177, SET HFM-130, NIAG Study SG-278) have and are currently addressing CogWar. Of notable relevance to this call was the HFM-356 Exploratory Team (ET) established in November 2021 to perform an assessment of the S&T required to ‘Mitigate and Respond to CogWar’. The team proposed a roadmap to guide NATO and Allied Partners in future research activities and investments⁴. Building on this work NATO Science & Technology Board (STB) identified CogWar as one of four topics that need to be promoted and strengthened within the Collaborative Programme of Work (CPoW) to answer Nations’ needs. A CogWar workshop was held in Oslo, Norway on 08-11 November 2022, as a step to support this need. The workshop began by introducing CogWar as a domain of interest from multiple perspective, before breaking out into four distinct working groups. The thematic areas for the working groups were SA & Sensemaking, Cognitive Effects, Modus Operandi, and Technology Enablers & Force Multipliers. The outcome of the workshop was a series of Technical Activity Proposals (TAP) for future research, and the main results from the workshop will be presented at the symposium in October 2023.

B. MILITARY RELEVANCE

The alliance is vulnerable to attacks and campaigns intended to malignly influence attitudes, decisions and behaviours of individuals, groups, and societies, especially below the threshold of armed conflict. The aim of these attacks is to turn NATO strengths into vulnerabilities that weaken the alliance. The cohabitation of natural intelligence and artificial, or augmented intelligence, is at the center of this, as our thoughts, our military systems and our societies are increasingly shaped and augmented by machines, technologies, social medias, and as our dependency on data grows, as does the opportunity for operations in the cognitive dimension.

¹ AJP-3.10 - Allied Joint Doctrine for Information Operations

² AJP-10: Allied Joint Doctrine for Strategic Communications

³ AJP-3.10.1 - Allied Joint Doctrine for Psychological Operations

⁴ HFM ET-356 report is due for release in November 2022

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CogWar presents a significant threat to human decision-making at every level: strategic, operational, and tactical. This is evidenced by adversarial Information Operations (e.g., misinformation and disinformation campaigns), cyber-attacks, data intrusions and manipulation, data poisoning of AI algorithms, and the development and deployment of sophisticated neurotechnologies and neuroweapons. Hence, NATO and allied nations, must protect and preserve the integrity of their human and machine cognitive systems, data and data-networks as they are at risk of manipulation and modification to affect decision-making.

Adversarial CogWar is characterised by advances in, and effective application (weaponization/dual use) of technologies, Emerging and Disruptive Technologies (EDTs), aspects of the IE, and Information Communication Technologies (ICTs). The effects can create whole-of-society problems capable of disrupting our digital eco-systems, institutions, and democratic values. Cognitive attacks will likely be linked to our adversaries' military and strategic interests, making their deployment systematic and in many ways their impact predictable, if we are willing to accept it is happening, and invest in the ability and capability to make sense of what is occurring.

The HFM-361 symposium will make clear how NATO can employ instruments of power in the cognitive dimension, to fill gaps in policies, doctrine, defence planning and capabilities where we experience adversarial doctrine that adopts an integrated approach. This will support our mitigation and response efforts to an adversary willing to use unrestricted capabilities across 'our' pre-defined conflict spectrum from peacetime, to crises, to armed conflict.

Contributions to the HFM-361 CogWar Symposium should support NATO capability development to effectively acquire and preserve Cognitive Superiority. Through the identification, reduction or elimination of cognitive interference or manipulation, with increased cognitive resilience and cognitive security, we can ensure freedom of action for military decision-makers, allowing them to maximize and synchronize multi-domain warfighting effects across the conflict spectrum. It will also contribute to how we adapt Education & Training to achieve these goals.

C. SCIENTIFIC OBJECTIVES AND EXPECTED ACHIEVEMENTS

CogWar presents the NATO S&T community with challenges as well as opportunities. Through theoretical and applied science we need to build and understand the evidence base, assess the state-of-knowledge, and identify the gaps in policy and doctrine relating to legal and ethical frames of conflict. Doing so can reveal and guide the creativity - the 'art' of CogWar - necessary to take NATO forward stronger, more secure, and better able to achieve and maintain Cognitive Superiority. Opportunities also lie in providing knowledge-based advice to decision-makers, e.g., on capability development to ensure effective defence against adversarial CogWar, on policies to define principles of responsible use of own 'active measures' in CogWar, or on policies to strengthen human resilience and cognitive security to mitigate civil society and state vulnerabilities.

The HFM-361 Symposium will address CogWar from a multi-disciplinary perspective where developments, research activities, and actions in one field may have implications for other areas of research. In addition, developments in one field may present opportunities for other disciplines when actuated in or applied differently in an operational context.

For this reason, the HFM-361 Symposium intends to encourage contribution that fall into, and/or our inspired by the HFM ET 356 work, as well as the STB November 2022 Oslo workshop.

The HFM ET 356 presented a framework to guide future research activities and investments. The purpose of the 'House Model' was to communicate a start point for S&T. A visual framework of components that the ET assessed can provide initial optics for CogWar related research. It can be read from a defensive and offensive perspective.

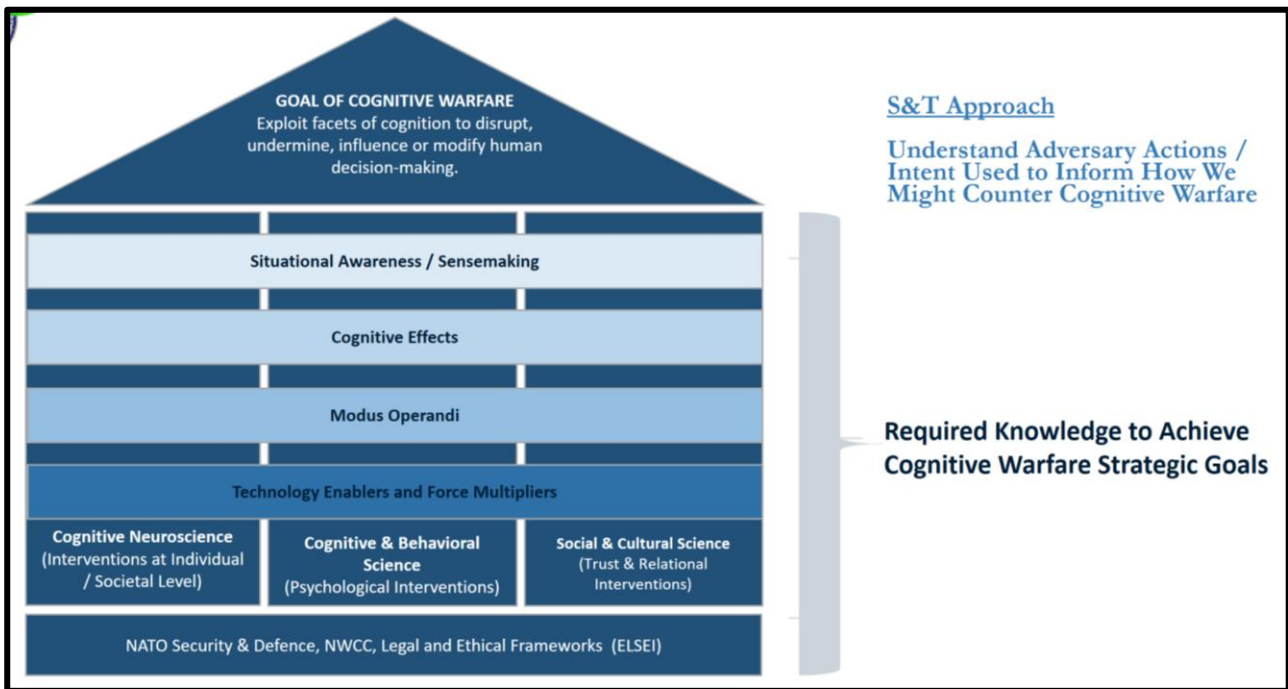


Figure 1. The HFM ET-356 House Model.

The following is an introduction to the knowledge areas within the House Model and aims to help potential HFM 361 Symposium contributors identify their field within the CogWar framework.

The three pillars identify the fields of knowledge required to influence a Target Audience (TA).

- Advances in **Cognitive Neuroscience** and brain research will play a critical role in future CogWar. These areas of research will likely prove to be the most significant areas of defence against CogWar since they also present opportunities for adversaries to engage in novel ways to target the human brain and neural systems.
- **Cognitive & Behavioural Science** research focuses on the ways that adversaries aim to exploit human psychological vulnerabilities in the cognitive and behavioral domain. There is a need to develop tools and technologies that will protect and defend us against effects that target human cognitive and psychological vulnerabilities.
- Research into **Social & Cultural Science** offers a unique insight into, for example, the socio-technical mechanics of audience engagement and psycho-social effects generation, as well as potential interventions or responses to neutralize, mitigate or counter cognitive attacks on audiences. Insights from this pillar help inform the development of both offensive and defensive facets of CogWar, particularly characteristics of social interaction between groups and organizations through large-scale societal interactions.

The horizontal bars in the House Model identify four operationally pertinent aspects that are relational to the three knowledge pillars. Each aspect is impacted by or has impacts upon one or all the pillars depending upon how it is applied in an operational CogWar context. The aspects present opportunities to consider the 'What', 'Where', 'When' and 'How' of S&T knowledge needs.

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The **SA & Sensemaking** aspect encourages research from varying disciplines that examines the factors that enable or block attempts to make-sense of a purposely obfuscated, complex, or ambiguous situation. This may include how we chose to develop and deliver such operational effects to affect SA and sensemaking in an individual leader, or a nation-state who may be about to be invaded. Sensemaking informs and is a prerequisite to SA and decision-making. As such, the requirement for trusted and unbiased data input, systems of evaluating meaningful information (sense-to-sensemaking), integration with knowledge and experience is all necessary to achieve an understanding of evolving non-linear events.

The **Cognitive Effects** aspect describes the desired goal of the actor in accordance with their strategic, operational, or tactical goal. This could be a temporal change in cognition to 'distort', 'distract', or 'enhance'. Or it could be more permanent to **degrade** the brain until it is dead. Or less extreme to **degrade** (over time) for example trust in democratic institutions, a political party, or to **influence** a target audience to follow narrative A instead of narrative B. An example of this horizontal with the neuroscience pillar could be in neurobiology and the effect to 'injure' of 'impair' cognitive functions to trigger a social contagion.

Modus Operandi is the examination of adversarial methods and strategies to generate the desired effect on the target audience. This includes learning to understand when and how certain methods are employed to exploit cognitive vulnerabilities. Research is needed to learn about the synchronization of activities by adversaries to psychologically prime a target. Closer appreciation for TTPs can lead to better understanding of when and how adversaries conduct CogWar. This knowledge will provide defenders with insight regarding development and validation of countermeasures and defensive strategies.

In CogWar **Technology Enables** and functions as a **Force Multiplier** for an actor who may want to utilize either *Cognitive Neuroscience*, *Cognitive & Behavioral science*, and/or *Social & Cultural Science* independently or simultaneously in pursuit of their goal. As an enabler or force multiplier, technologies are aspects of CogWar that can: affect SA & Sensemaking processes, be instrumental in defining, and creating the capabilities for Cognitive Effects (e.g., distort, disrupt, impair, stimulate...), and define the delivery method (Modus Operandi) to exploit facets of cognition.

This symposium hopes to encourage contributions that investigate CogWar in areas where the pillars overlap with the horizontal aspects. It is in these folds that creativity, novelty, and discovery lie. By focusing on these areas, we hope to scaffold understanding of adversarial actions or intent and inform how we mitigate, respond or counter CogWar effects. There are also approaches to Education & Training (E&T) that need to be introduced if we are to build knowledge, resilience, and capabilities.

The Scientific Objectives of the Symposium are as follows:

- Share the most recent research to enhance NATO understanding about adversarial CogWar strategies and application of technologies and methods with a focus on those designed to elicit disruptive psychological, neurological, and sociological effects.
- Inform scenario design, modelling and simulation, to provide advice on the use of [immersive] technologies to support individual and collective E&T activities for NATO force development.
- Assess, critically examine, and convey relevant case studies and lessons learned from CogWar activities.
- Impart new knowledge on TTPs and/or technological approaches to identify, mitigate, and respond / counter CogWar and contribute to building cognitive resilience and cognitive security.

D. TOPICS

The committee has chosen not to prescribe topic areas. The House Model provides a broad framework from which we hope authors can identify their field and how it contributes to the context of Mitigating and Responding

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to CogWar. **When submitting abstracts, we request authors indicate how or where they consider their work relates to the House Model.** This will help us structure the symposium, as well as develop the model in more scientifically grounded way.

E. PROGRAMME COMMITTEE

Chairpersons

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Organising Committee Members

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F. ABSTRACTS, PAPERS AND MEETING PROCEEDINGS INFORMATION

Papers are solicited that draw from historical perspectives, leadership experience, and research insights, and should contribute to a clearer, shared understanding of how national contributions to alliance activities can be linked to collective military objectives.

Authors are invited to submit abstracts that should provide an explicit statement of the content of the paper and its relevance to the symposium. Abstracts should be (from 500 to 800 words) in English. The word count is excluding diagrams, figures (with short captions), and references. The abstract should adopt the following format:

- Title
- Authors and affiliations
- Abstract (from 500 to 800 words)
- References
- One figure with caption (optional)

Authors are kindly requested to use the attached **Abstract template**.

Abstract shall be Public Releasable.

Contributions from military operations and industry communities are welcome.

An indication of symposium theme(s) into which the paper would most logically fit would be of assistance to the Programme Committee who will adjudicate the submitted papers. For this purpose authors are kindly request to use the attached **Authors questionnaire**.

Abstracts should be submitted electronically in PDF or MS Word format to the Programme Committee Chairs, Dr Benjamin J. KNOX: benjamin.j.knox@ntnu.no and Mr. Paolo PROIETTI: paolo.proietti@leonardo.com and to the HFM Panel Assistant, Marie LINET marie.linet@cso.nato.int **no later than 17th February 2023 for US Authors and U.S. affiliated, and no later than 03rd March 2023 for Authors from other Nations.**

Authors will be notified of the Programme Committee decision by **05th May 2023**. Authors of accepted abstracts should submit a full paper version by **08th September** and **22nd September** respectively in accordance with the paper template which will provided upon acceptance.



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Accepted Papers should be accompanied by a signed **Publication Release Form** available at the NATO STO website. **Without this form signed no material will be published on the NATO STO website** <https://www.sto.nato.int/Pages/support-for-authors.aspx>.

G. CLASSIFICATION

The symposium will be conducted at a **Public Release** level.

H. PARTICIPATION

Participation is open to NATO Nations, STO EOP, GP, MD, PfP

I. PRELIMINARY SCHEDULE

- Call for Paper Issue: **24th November 2022**
- U.S. Abstract submission: **17th February 2023**
- Abstracts submission: **03rd March 2023**
- Abstracts acceptance notification: **05th May 2023**
- Opening registration: **07th July 2023**
- Programme Publishing: **07th July 2023**
- US Paper submission + Presentation: **08th September 2023**
- Final paper submission + Presentation: **22nd September 2023**
- Closing registration: **01st October 2023**
- **Symposium** **16th-17th October 2022**

If you have any questions, please contact any of the undersigned.

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SPECIAL NOTICE FOR U.S. AUTHORS AND NON-U.S. AUTHORS AFFILIATED WITH U.S. ORGANIZATIONS

Abstracts of Papers, Papers and Publication Release Forms from the U.S. must be sent ONLY to the following P.O.C.:

NATO S&T Organization U.S. National Coordinator

OASD(R&E)/International Technology Programs

4800 Mark Center Drive, Suite 17D08

Alexandria, VA 22350-3600

Tel: +1 571-372-6539 / 6538

E-MAIL: OSD.PENTAGON.OUSD-ATL.MBX.USNATCOR@MAIL.MIL

1. All U.S. Authors must submit one electronic copy to this P.O.C. by **17th February 2023**.

The P.O.C. will forward all U.S. abstracts to the Programme Committee.

2. All U.S. Authors must include the following statement in a covering letter to the P.O.C.:

- The work described in this abstract is cleared for presentation to NATO audiences.
- If work is sponsored by a government agency, identify the organization and attest that the organization is aware of the submission.
- The abstract is technically correct.
- The classification of the abstract is Public Release.
- The abstract does not violate any proprietary rights.

In addition to their abstract, all U.S. Authors must provide the P.O.C. with:

- 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 US P.O.C. After review and approval, the US P.O.C. will forward all U.S. abstracts to the HFM Panel Office, who will send them to the Programme Committee.

U.S. authors are encouraged to address questions and concerns to the P.O.C. as early as possible. Delays in meeting P.O.C. deadlines will impact the timely submission of your abstract.