

MAIN CONFERENCE DAY ONE

28 AUGUST 2019

0830 **REGISTRATION & COFFEE**

0900 **CHAIRMAN'S OPENING REMARKS**

STRATEGIC AND TACTICAL CONSIDERATIONS IN RADAR

0910 **KEYNOTE PRESENTATION: AIRBORNE EARLY WARNING SYSTEMS UTILITY IN THE 5TH GENERATION**

- Demonstrating the current systems utilised for airborne early warning in HQ NORAD
- Consolidated airspace management for all around Homeland defence
- Outlining capabilities and limitations of an airborne early warning system against ground based alternatives
- Fostering creative solutions to the challenge of maintaining a constant listening watch



Mr Brian 'Bear' Lihani, Chief, Aerospace Warning Branch, HQ NORAD

0950 **GROUND BASED AIR DEFENCE: WHERE DOES NATO NEED TO BE?**

- Outlining current ground based radar systems and networks across Europe
- Building C2 across multiple nationalities, command structures and surveillance systems
- Assessing current capability and surveillance gaps in NATO's deployed radar structure, and the implications for the Air Defence Command
- How does NATO achieve total radar coverage in the next 5 years?



Colonel Timothy Shaffer, Chief, Air and Missile Defence, US Army Europe

1030 **MORNING COFFEE AND NETWORKING**

1110 **OPERATIONS IN TACTICAL RADAR: UTILISING PORTABLE SEARCH AND TARGET ACQUISITION RADAR (P-STAR)**

- Outlining how P-STAR radar is utilised at tactical unit level for early warning
- Balancing the advantages of mobility against limited range restrictions
- Linking tactical radar awareness into the wider operational picture
- Understanding how requirements for longer range awareness may alter the tactical setting for Air Defence



Colonel Paulo Rosendo, Commandant Air Defense Artillery Group (GAAA), Portuguese Armed Forces

1150 **HYPERSONIC MISSILES: IS THE BALANCE OF POWER CHANGING IN EUROPE?**

- Hypersonics - hype or a real game-changer?
- Russia's hypersonic capability - implications for NATO
- Will Hypersonic weapons alter the balance of power in Europe?



Lieutenant Colonel Dr. Jyri Raitasalo, Military Professor of War Studies, Finnish National Defence University

1230 **NETWORKING LUNCH**

TECHNICAL INNOVATIONS FOR TARGET TRACKING

1330 **EIGENWAVEFORM RADAR IN EXTENDED TARGETS IDENTIFICATION SCHEME COMBINING WITH AESA AND DBF**

- Radar Eigenwaveform capability and application to multiple moving extended targets identification scheme in Radar system
- Active electronic scanning array (AESA) architecture and advantages and the comparison of passive electronic scanning array (PESA)
- Digital beam forming scheme of phased array radar systems.
- Introduction of the advanced phased array systems of the Republic of China in Taiwan



Lieutenant Colonel Jo-Yen Nieh, Assistant Professor, Technology College of National Defence University Taiwan

1410 **PANEL DISCUSSION: OUTLINING THE FUTURE OF MILITARY SURVEILLANCE**

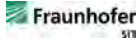
- What are the likely future challenges to the military radar community?
- Does Military Radar have a future? Will the growing capabilities of alternative surveillance systems and EW make radar redundant?
- What does the panel understand to be the greatest threat to the radar community?
- How will the growing interference in the EM Spectrum impact radar development?

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1450 **RECENT PROJECTS ACROSS THE FRAUNHOFER INSTITUTE**

- An overview of developments in Airborne high-resolution surveillance radar
- Advances in Multi-functional RF Systems for Radar and EW
- Radar-Sensors for Space Situational Awareness

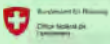


Professor Doctor Peter Knott, *Executive Director, Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR*

1530 **AFTERNOON TEA AND NETWORKING**

1600 **MILITARY PRIMARY 3D PHASED-ARRAY RADAR**

- Outlining performance measurement procedures for Phased Array Radar
- Tools and principles for 3D application in the military
- Simulations of three typical types of arrays formed: diagonal planar array, trapezoidal array and curved surface array
- Studies of modelled 3D phased array in practical applications



Maxime Bagnoud, *Senior Programme Manager, Swiss National Airspace Surveillance System, Armasuisse*

1640 **PRACTICAL EXPERIMENTS IN PASSIVE RADAR SYSTEMS LOCALISATION AND DETECTION**

- Defining the parameters for detection and localisation
- Lessons learnt from passive experiments with DSTL
- Adaptive thresholds for cross correlation and implications on deploying these systems in theatre
- Contrasting Passive and Active Radar systems for LSS detection



Dr Mathini Sellathurai, *Associate Professor, School of Engineering & Physical Sciences; Sensors, Signals & Systems, Heriot-Watt University*

1720 **CHAIRMAN'S CLOSING REMARKS AND END OF CONFERENCE DAY ONE**



MAIN CONFERENCE DAY TWO

29 AUGUST 2019

0830 **REGISTRATION & COFFEE**

0900 **CHAIRMAN'S OPENING REMARKS**

MANAGING COMMAND AND CONTROL IN PHYSICAL AND ELECTROMAGNETIC DOMAINS

0910 **FORTHCOMING IMPLEMENTATION, ADVANCES AND CHALLENGES OF NATOS AIR COMMAND COMMUNICATION SYSTEM (ACCS)**

- Understanding current NATO ASACS & C2 sites across Europe, and managing sites across national controls
- Identifying barriers to coherent ACC within the existing force structure, and practical steps to mitigating these control challenges
- Bringing homogeneity in NATO's C2 for enhanced battle management capability
- Developing and implementing new systems to enable full Air C2 on offensive and defensive operations



Lieutenant Colonel Nikolaos Kipenis, Air Battle Management-Weapons Control, Hellenic Air Force

0950 **CHALLENGES & OPPORTUNITIES FOR RADAR COUNTERING SMALL UAS**

- Discussion on recent trends in monitoring small UAS using radar
- Additional points on Micro-Doppler phenomenology and how this can support target classification
- Some experimental results from academic literature, in particular birds vs UAS & payload estimation



Dr Francesco Fioranelli, Lecturer in Electronic Engineering, University of Glasgow

1030 **MORNING COFFEE AND NETWORKING**

1110 **ADS OPERATION IN THE EW SPACE**

- Understanding where radar system capability exists within Electromagnetic Spectrum Operations (EMSO) for the military
- Demonstrating how the military currently responds to the challenges from the EM spectrum through reduced bandwidth operations
- New radar systems development to combat the rapidly expanding Electromagnetic spectrum and the implications of larger networked systems
- Building an effective model for operations in the EM spectrum



Istvan Balajti, Senior Technical Officer Air Surveillance Systems Management Group, Communications, Air and Missile Defence Programme (LD), NSPA

1150 **PANEL DISCUSSIONS: WHAT IS THE GREATEST THREAT TO OPERATIONS WITHIN THE EW SPACE?**

- How should we understand the EW space? Is the continuous environment combining cyber, sensors and radar systems most appropriate, or is this overly complex?
- What are the strengths and vulnerabilities of operating under the continuous environment model?
- What defines system cognition in CEMA?
- How is EW changing? What are the implications for the radar specialist?

1230 **NETWORKING LUNCH**

FUTURE REQUIREMENTS AND PROJECTED DEVELOPMENTS IN RADAR CAPABILITIES

1330 **ARCHITECTURES FOR COGNITIVE RADAR**

- Identifying the three ingredients basic to the constitution of cognitive radar: intelligent signal processing, feedback from the receiver to the transmitter, preservation of the information content of radar returns
- Modelling the Bayesian approach to target detection through tracking
- Comparisons with bat echolocation; a physical realization of cognitive radar
- Applying these theories to cognitive radar in the military environment



Dr Clayton Stewart, Department of Electronic and Electrical Engineering, University College London

MAIN CONFERENCE DAY TWO

29 AUGUST 2019

1410 PROGRESSIONS IN QUANTUM RADAR

- Demonstrating current research progress into deployable quantum radar systems
- Measuring quantum radar capabilities against conventional radar systems
- Advantages of Quantum in countering next generation stealth technology
- Anticipating the timelines for Quantum Radar systems being deployable for military air defence forces



Dr Wim van Rossum, *Senior Scientist Radar Technology, TNO*

1450 AFTERNOON TEA AND NETWORKING

1530 AESA RADARS – WHERE DO WE GO FROM HERE?

- Understanding AESA technology developments since inception
- Contributions of Gallium Nitride in improving AESA performance
- Advances in signal processing and artificial intelligence to enhance AESA radars capability
- Realising genuine cognitive AESA radars, and the contribution of these sensors to future conflict



Dr Thomas Withington, *Electronic Warfare, Radar and Military Communications Specialist*

1610 ENABLING TECHNOLOGY FOR DEPLOYABLE SPACE ANTENNAS

- Developing enabling technologies for deployable space technologies
- Viability of SAR antennas for Earth observation and UHF SATCOM.
- Modelled advantage in adaption; defining future EW and Radar systems in the cognitive age



Alan Thompson, *Co-Director, Eureco Technologies*

Martin Thompson, *Co-Director, Eureco Technologies*

1650 CHAIRMAN'S CLOSING REMARKS AND END OF CONFERENCE DAY ONE

“The summit provides a unique opportunity for military, industry and researchers to exchange opinions on current military radar requirements in a volatile and changing operational environment”

Commander, 25th Air Defence Brigade,
Czech Army – Past Delegate

“The conference provided me with valuable insight into military requirements across the globe.”

Radar Scientist, DSTL – Past Delegate

PRE-CONFERENCE WORKSHOP

27 AUGUST 2019

0930-1130

WHAT IS THE FUTURE OF AIRBORNE EARLY WARNING SYSTEMS?

Significant upgrade packages are currently planned for Airborne Early Warning System capability across the US and NATO as current systems become outdated and surpassed by modern threat capabilities from state and non-state actors. However, with ground based alternatives becoming increasingly far ranging, new threats emerging capable of by passing airborne surveillance systems, and airborne platforms remaining exposed to opposition anti-air systems, this workshop will explore the future viability and deployment of Airborne Early Warning in the future operational environment.

This session will focus on the role AWACS will continue to have within the military aerospace warning community, and how future airborne surveillance can most effectively employed in the future. Key topics that workshop participants will focus on include:

- How will UAVs, hyper glide vehicles, stealth technology, advanced cruise missiles, drones affect future surveillance systems?
- Will examine the capabilities of these types of airborne systems
- Technical advances in aerospace warning capabilities
- Discuss how industry and allies will have to cope with these issues in the development of future surveillance systems

By attending this workshop, you will be able to;

- Explore the future of airborne early warning systems across HQ NORAD and NATO
- Manage your airborne capability requirements to mitigate capability loss in existing airborne surveillance systems
- Inform future procurement to sustain airborne early warning utility in the future operating environment

About your workshop leaders



Mr Brian 'Bear' Lihani,
Chief, Aerospace Warning Branch,
HQ NORAD

Mr. John Brian Lihani is Chief, Radar Warning Branch, Operations Directorate, HQ NORAD, Peterson AFB, CO. He is a senior air

defense operations analyst and as branch chief he directs, organizes and exercises management over employees assigned to the Radar Warning Branch. Manages branch tasking processes and enforces command directives providing oversight for operational integration of existing and new systems to accomplish NORAD's aerospace control and warning mission.

Mr. Lihani is from Pasadena, California. After graduation from the University of Kentucky and receiving his commission as a Second Lieutenant, he entered the Air Force in 1977. He earned his Master of Science degree in Aerospace Operations from Embry-Riddle Aeronautical University in 1997. His military background includes various duties in as a Personnel Staff Officer, Director of Base Personnel, Base Commander Executive Officer, Air Battle Manager, Unit Commander, Director Sector Operations Control Center, and Commander of the Air Warning Center inside the legendary Cheyenne Mountain Air Force Station.

Mr Lihani has served with NATO forces and Republic of Korea forces. He has participated in Top Gun, Red Flag, Adversary Tactics and Top Scope competitions.



Dr Thomas Withington,
Electronic Warfare, Radar
and Military Communications
Specialist

Thomas Withington has two decades of experience as a writer and analyst specialising

in contemporary and historical electronic warfare, radar and military communications.

During his career he has authored several books and written hundreds of articles on these subjects for a range of general and specialist publications. In addition, he has worked as a consultant examining these domains for an array of leading public and private sector clients.

His work has seen him accompany operational sorties in a number of theatres, notably with the French AWACS force during NATO's 2011 operations over Libya. He is also a regular commentator on defence and military issues for several media organisations around the world. He holds a PhD in history, and his thesis examined the use of electronic warfare in support of air operations.