NATO UNCLASSIFIED
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16 October 2019

DOCUMENT
AC/259-D(2019)0029 (INV)
NIAG-D(2019)0021 (INV)
Silence Procedure ends:
23 Oct 2019 17:30

CONFERENCE OF NATIONAL ARMAMENTS DIRECTORS (CNAD)
NATO INDUSTRIAL ADVISORY GROUP (NIAG)
Proposals for Advisory Studies by the NIAG in Budget Year 2020

Note by the Secretary

1. NIAG studies constitute a key mechanism by which industry advice supports the work of the CNAD, CNAD's sub-groups and wider NATO activities.

2. The preparation of the 2020 NIAG study programme went through a series of activities (study proposals formulation, agreement and priority assignment within each study sponsor entity, NIAG roundtable) and has now passed a key milestone that is the agreement of study priorities across the entire portfolio by CNAD Main Group Chairs during the Main Group Forum on 09 October 2019.

3. The resulting NIAG Studies Programme for 2020, at annex, is now submitted for your approval.

4. The proposed studies package includes:

Annex 1 – Proposed NIAG Studies 2020 – Overview

Annex 2 – Proposed NIAG Studies 2020 – Step 1[1] Studies description.

5. Unless the CNAD Secretary hears to the contrary by **17:30 hrs on Wednesday, 23 October 2019,** it will be assumed that the CNAD in Permanent Session has approved the proposed NIAG studies programme for 2020 as set out in Annex 1, and the Budget Committee will be informed accordingly.

Silva AHER

2 Annexes

Action Officer: Laurent Foissey (x3906)
Original: English
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[1] NIAG-D(2011)0022 – NIAG Handbook

ANNEX 1
AC/259-D(2019)0029 (INV)
NIAG-D(2019)0021 (INV)

LIST OF PROPOSED NIAG STUDIES FOR THE CALENDAR YEAR 2020

Nr	Sponsor	Study Title	Open to Partners
1	CASG	STANAG study for a joint safety and suitability for service evaluation process which will include safety and strength of design tests of sensitive electronic, electromechanical and optical components used in guidance system of Gun Launched Guided Munitions (GLGM)	IP
2	NAAG/JCGGBAD	GBAD Operations against the 21st Century Peer Nation Cruise Missile and Unmanned Aerial Systems (UAS)	FIN, SWE and SWI
3	NAFAG/ACG2	NATO's targeting and interoperability challenges for Network Enabled Weapons (NEW) in the 2035 threat environment	SWE only
4	NAAG/LCGDSS	Assessment of Human Augmentation Technologies for Exploitation in Battlefield	IP and Singapore
5	NNAG/AWWCG	Requirements for the next generation AWW targets	Potentially open to Australia, Japan, Sweden, and New Zealand
6	NNAG/AWWCG	Future EW design	No
7	NNAG / UWWCG	Sonobuoy Secure Telemetry	Potentially AUS, NZL, JPN, ROK

Nr	Sponsor	Study Title	Open to Partners
8	NAAG/JNLWCG	Low-Collateral Damage C-sUAS Effectors Other than Jammers	Selected partners (tbc)
9	NNAG/UWWCG	Overarching C2 for UUV Systems	IP
TOTAL BUDGET(*): 2.25 M			

(*) Each NIAG study budget is determined considering both length/complexity of the study but also the number of participants to ensure a fairly comparable level of effort per participant across the NIAG studies portfolio. The budget for each study will therefore be confirmed after the exploratory group meeting has taken place.

Reserve list (in priority order):

Nr	Sponsor	Study Title	Open to Partners
R1	LCMG/WG/3	Tender Evaluation Matrix for Military Procurements	PFP
R2	NNAG/SDCG	Water Mist Mitigation of Weapon Effects	IP
R3	NNAG/JCGUAS	Unmanned Aircraft Systems (UAS) Airworthiness, Assessing Acceptable Risk to Third parties	PFP + AUS, ISR
R4	C3B (recommended ACT funds)	Introduction of Data Centric Security (DCS) for enhanced sharing, protection and control of NATO data assets	IP

ANNEX 2
AC/259-D(2019)0029 (INV)
NIAG-D(2019)0021 (INV)

DESCRIPTION OF PROPOSED NIAG STUDIES FOR CALENDAR YEAR 2020

Nr. 1 CASG – continuation of NIAG SG.230

This 2-year project was approved under reference AC/259-D(2018)0009 dated 15 March 2018 and Action Sheet dated 4 April 2018. The project was launched in May 2018 and will conclude by December 2020.

Nr. 2 NAAG/JCGGBAD

This 2-year project was approved under reference AC_259-D(2019)0005 dated 7 February 2019 and Action Sheet dated 21 February 2019. The project was launched in February 2019 and will conclude by March 2021.

Nr. 3 NAFAG/ACG2

1. Title of Proposed Study:

NATO's targeting and interoperability challenges for Network Enabled Weapons (NEW) in the 2035 threat environment.

2. Brief Description of Proposed Study:

The mission of Aerospace Capability Group 2 (ACG2), a sub-group of the NATO Air Force Armaments Group (NAFAG), is to promote and enable, in the aerospace and joint domains, multi-national cooperation on delivery of interoperable military capabilities to improve NATO forces' effectiveness in the area of Effective Engagement[2] of NATO Nations' aerospace assets in support of current and future operations. In support of that mission, this study should identify and address the targeting and interoperability challenges posed by employing NEWs in the 2035 threat environment.

3. Background:

NEW differs from standard operational concepts by emphasizing post-launch command and control of weapons attacking fixed, moving, and time sensitive targets within moments of detection under any weather condition. Successful

[2] Effective Engagement is the capability of successfully employing air weapons systems across the wide spectrum of possible operational scenarios and/or missions.

implementation of this concept will require establishing current and future weapons as a viable communications node within Alliance networks.

4. Objectives of the Study:

The overall objective of the study is to advise ACG2 members on what industry can contribute to ensuring a viable NEW capability for the Alliance.

Liaison Team members should have expertise in the following areas:

a. Acquisition of targets at long-range using ISTAR assets
b. Engagement of moving targets
c. Battle Damage Indications
d. Bandwidth and network design
e. Rules of Engagement/Law of Armed Conflict considerations
f. Emerging US NEW doctrine (needs to include both air and maritime positions)

As a starting point, Liaison Team members should consider the following questions:

a. Define NEW: should there be different categories (cruise missiles vs. small bombs)?
b. Which networks are eligible (CNR/UHF, L16…), which protocols (K vs J messages)?
c. What data needs to be transmitted with respect to network capabilities?
d. How resilient can NEW be in a contested environment?
e. How do we deal with GPS jamming?
f. What distance from the host platform or the controlling platform to the effector must be achieved to make NEW worthwhile?
g. Are there practical/ pragmatic means by which NEW can be integrated into existing Combat Air platforms – either as launch platforms or controlling platforms?
h. Could wide body aircraft and/or ISTAR platforms fulfil a role in NEW given the threat?
i. What limitations are placed upon NEW in ‘swarm’ attacks by the well understood limitations of Link-16 net stacking?
j. Legal and technological feasibility of whether or not Alliance nations could control each other’s weapons in flight?
k. What level of target discrimination is necessary (on the platform or for the weapons)?
l. How should mission planning/preparation be dealt with?
m. What needs to be standardized?
n. How can modelling and simulation help to develop NEW?

5. **NATO Priority**: High

6. **Intended Follow on to the Study**: Incorporate any recommendations into the Programme of Work of the NAFAG Air Capability Group 2 (ACG2) and propose a follow NIAG study on how to train for these recommendations.

7. **Other NATO Bodies Involved in the Related Area of Work**: C3B, STO, JAPCC and relevant NAAG/NNAG sub-groups.

8. **Current Industrial Involvement in the Area of Work**: Not known

9. **Proposed Start Date**: Early 2020

10. **Desired Completion Date**: Early 2021

11. **Study Classification**: NATO SECRET

12. **Study Open to Partners**: Yes (Sweden)

13. **Sponsoring Group Point and IS Point of Contact**:

Col Patrick Bryant FAF, Chairman of NAFAG ACG2
Mr Alexander DeFazio, IS-DI and Secretary of NAFAG ACG2

Nr. 4 NAAG/LCGDSS

1. Title of Proposed Study:

Assessment of Human Augmentation Technologies for Exploitation in Battlefield.

2. Brief Description of Proposed Study:

This study will review and analyze opportunities for moving new and emerging augmentation technologies from state-of-art to state-of-practice for training and operations within the NATO alliance nations. Such technologies include:

- advanced IT tools (Virtual/Augmented/Mixed Reality) to improve situational awareness;
- exo-skeletons for empowering the soldier;
- drugs to improve alertness;
- neuro-enhancement;
- …

The objective is to assess the effect of new/emerging system interaction capabilities for individual and units on learning, retention, performance and transfer, and their ability to

manage physical and cognitive load and the time/cost to reach a required level of competency.

3. Background:

The maturation of various technologies (e.g., augmented reality, virtual reality multimodal immersion, assisted cognition, wearable devices and mechanics) has created opportunities for evaluating their applicability to training and operational environments within NATO countries. Because of the relevance, various studies have provided background in these areas. Many of these insights are summarized in NATO Emerged and Emerging Disruptive Technologies (E2DT). However, since that work was completed (2010), there have been significant advancements and technology innovations, which have the potential to revolutionize training and operational practices.

4. Objectives of the Study:

Assess current and emerging technologies to aid military personnel during training, education, and operations resulting in accelerated learning, enhanced performance of operational tasks, improved retention, and more efficient transfer of skills from training to operations;

Assess tools and methods to overcome negative effects of promising augmentation technologies (e.g., simulator sickness);

Analyze the feasibility of battlefield employment of the discovered technologies with respect the achievable superiority;

Examine the return on investment (ROI) to adopt and deploy any promising augmentation technologies discovered during this assessment.

5. NATO Priority:

The capability to be able to reduce the training time of every Soldier, Sailor, Marine, and Aviator in all the military organizations of every NATO country by 20-50% while simultaneously enhancing their memory, recall, and performance during operational tasks. It will support the associated NDPP targets and the related long term aspects of capability requirements.

6. Intended Follow on to the Study:

An analysis of emerging technologies will offer NATO substantial and unique opportunities for developing more efficient training (e.g., reduced time/cost to competency) and performance aids for operations. Moreover, as these technologies evolve, consideration of the requirements for standardization and interoperability must be addressed. The nature, extent, availability, and feasibility of these opportunities will be researched and reported.

7. Other NATO Bodies Involved in the Related Area of Work:

ACT, NATO STO, NATO CoEs, DAT POW

8. Current Industrial Involvement in the Area of Work:

Research within various NATO nations and several commercial enterprises have produced capabilities and technologies (tools and methods) to supplement instructional and intelligently-guide experiences during training and operations. In addition, multimodal immersion and interoperability are areas of increasing research interest. This proposal was initially presented by the NIAG as an industry spontaneous proposal.

9. Proposed Start Date: 01/01/2020

10. Desired Completion Date: 31/12/2020

11. Study Classification level:

NATO Unclassified, releasable to IP and Singapore

12. Study Open to Partners?

Yes – open to IP and Singapore

13. Sponsoring Group Point of Contact and IS Point of Contact:

NAAG LCGDSS
Torstein Epsolin Johnson
Chairman LCGDSS - Soldier Capability Assessment SubGroup (SCAG)
tejohnson@mil.no

Nr. 5 NNAG/AWWCG

References:

A: NIAG Study Group 200: Low, Slow and Small Threat Effectors Study.
B: NIAG Study Group 170: Engagement of low, slow and small Aerial Targets by GBAD.

1. Title of Proposed Study:

Develop the requirements for the next generation of AWW targets.

2. Brief Description of Proposed Study:

The overall purpose of this proposed study is to provide an objective analysis of what types of targets will be best suited to study emerging threats. This study would evaluate the speeds, threat profiles and seeker types that are needed to allow maritime assets to track and engage future threats. This is done with the aim of enabling procurement teams and industry experts to express what requirements need be established for the procurement of future systems.

To study the Anti Air Warfare (AAW) aspects, we propose that the study review the development of the capabilities of subsonic, supersonic, and hypersonic threats as well as the impact of the ever increasing threat of Unmanned Air Systems (UAS) by both nations and terrorist organizations. This will enable the study to build requirements for the next generation of air targets to best test future Naval Anti Air and Ground Based Air Defence (GBAD) systems. To study Anti Surface Warfare (ASUW) aspects we propose that the study conduct the same horizon scanning towards advancements in electronics and material sciences to shape the requirements for future surface targets. As target technology has developed so too has our ability to track them with new sensors such as EO/IR systems and advanced radars coming into use. From remotely piloted fast inshore attack craft to advances in signature reducing technologies for larger vessels we need to avoid testing our capabilities against targets representing yesterday's threats and look ahead to incorporating future developments into the next generation of naval targets.

3. Background:

Built upon years of experience, a variety of target simulation methods are currently available to NATO nations, with targets like the BQM-74E proving to be a reliable replication of legacy threats suitable for the current generation of sensors and Hard Kill (HK) systems. However as electronics become continually more cost effective we are finding an ever increasing variety of threats available on the market. As a result there is a need to look ahead and develop the next generation of Above Water Warfare (AWW) targets. This was a conclusion of Ref A which pushed for the need for continuous "Horizon Scanning", i.e. the assessment of new and emerging threat missions, platforms and technologies and the examination, preferable in a modelling and simulation environment, of the likely impact on NATO Ground Based Air Defence (GBAD) and any possible mitigation measures that can be introduced. At Ref B, NIAB Study group 170 articulated the small aerial target threat from a land based GBAD perspective however opportunity full extent of the Maritime AWW battlespace.

Currently, throughout a diverse set of environments the NATO allies and other countries have demonstrated the utility of UAS and cruise missiles in recent conflicts validating the operational concept to the public. In addition, with falling unit cost and increasing capability these systems are entering the inventories of non-state actors. On the surface, smugglers continue to use semi-submersible vessels with a minimal cross section and alternative materials to avoid detection from maritime assets. These threats show the continuous advancements of threats, and Western Navies are having a challenging time keeping pace with threat representative target.

Meanwhile from a research perspective, as the threat of anti-ship and land targeting cruise missiles has developed significant research has gone into developing the radar systems required to track these threats. However an equal effort is conducted annually into making those threats and the aircraft that launch them more difficult to track resulting in a technological race between the threats and our ability to track and engage them. Finally, we have witnessed the expansion of the threat profile as development of hypersonic and ballistic missiles continue to challenge previously held notions.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

The objectives of the Study are:

- Review the development of subsonic, supersonic and hypersonic threats to determine what target characteristics requirements need to be to simulated;
- Review the next generation of UASs that could be employed against NATO maritime forces to determine what target requirements need to be simulated;
- Review developments in electronics and material science for surface tracking to determine which of these target characteristics will be required to simulated;
- Recommend technically feasible options for employment of next generation AWW targets; and
- Recommend future target requirements to enable standardization agreements amongst NATO nations.

5. NATO Priority:

This NIAG Study will contribute to:

- Defence Planning Priority – Maritime Engagement.
- Programme of Work of the Specialist Team in Maritime Air and Missile Defence.
- Potential Smart Defence Project.

6. Intended Follow-on to the Study:

- Enable focused follow-up studies as required into the following sub disciplines:
  - Subsonic Threats.
  - Supersonic Threats.
  - Hypersonic Threats.
  - UASs.
  - Surface threats.

7. Are any other NATO Bodies involved in the related area of work?

JCG GBAD
NATO FORACS

8. Is there any current industrial involvement in the area of work?

Yes, particularly by aerial target manufacturers.

9. Proposed start date: Autumn 2019 / Spring 2020

10. Desired completion date: Autumn 2020 / Spring 2021

11. Study Classification level: NATO Restricted

12. Study Open to Partners?

Potentially open to Australia, Japan, Sweden, and New Zealand

13. Sponsoring Group Point of Contact and IS Point of Contact:

Sponsoring Group Lead Nation = Canada

Sponsoring Group Points of Contact:

- CDR Andrew Graham, Royal Canadian Navy, Director Naval Requirements – AWW Requirements/ Chairman of NATO AAWCG, Andrew.Graham@forces.gc.ca / +18199393986

NATO Staff Points of Contact:

- Mr Paul Beckley, NNAG Secretary
  Beckley.paul@hq.nato.int

Nr. 6	**NNAG/AWWCG**

1. Title of Proposed Study:

Future EW System Design

2. Brief Description of Proposed Study:

To carry out a study into the options for future maritime EW systems design.

3. Background:

This study supports the need for interoperable forces using EW systems which are relevant against the future electromagnetic environment (EME) and the threat within it. An industrial

study is required in order to gather the best solutions from industry as suppliers of exploitable emergent technologies.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

The objectives of the Study are to determine the overall conceptual design of a future EW system (or components thereof) which may be capable of resolving the difficulty of EW operations in the future EME (passive and active, multi-spectral threats using GPS navigation, networked targeting systems, varied strategy of attack, need for real-time feedback and analysis etc.)
Such a system may, for example, take advantage of multi-band shared resources networked across varied platforms, leading to real-time shared situational awareness and decision support. Both active and passive sources will require integration with encyclopaedic and intelligence sources in order to generate this capability. The availability of high bandwidth data links will likely be a pre-requisite.

5. NATO Priority:

This NIAG Study will contribute to:

- Defence Planning Priority – Maritime Engagement
- Support nations in meeting their Capability Targets, in particular for “Warship Capable” where the need for modern capable EW systems is specified.
- Directly contribute to NDPP Targets:
    - M6202N Survivability and Naval Force Protection.
    - M3201N Above Water Warfare.
    - M7204N Maritime Situational Awareness.
- Supports Smart Defence Project 1.1052 Co-operative (Shipborne) ESM Operations (CESMO).

6. Intended Follow-on to the Study:

It is anticipated that the output from the study will present options for future EW system design and will result in areas of technology which require further research, development and demonstration, perhaps through the AWWCG or the CSO and maybe involving NEMO (NATO Electro Magnetic Operations) trials activity. Following from this it is likely that a firm requirement can be developed which may lead to a unified cross-NATO project for joint procurement of a solution.

7. Are any other NATO Bodies involved in the related area of work?

It is likely that CSO and CMRE will be involved with the work.

8. Is there any current industrial involvement in the area of work?

It is expected that the study will draw together the differing strands of related activity across the international industrial base.

9. Proposed start date: Autumn / Fall 2019

10. Desired completion date: Autumn / Fall 2020

11. Study Classification level: NATO SECRET

12. Study Open to Partners? (This is encouraged where possible): No

13. Sponsoring Group Point of Contact and IS Point of Contact:
Sponsoring Group Lead Nation = SCI-293 / AWWCG EW Panel

Sponsoring Group Points of Contact:

- Mr Dave Symmonds, Chair SCI-293
  NAVYMWC-AWWAWASMDOA@mod.uk +44(0)1329 33 5127

- Cdr Dirk Peter Voss, Chair AWWCG EW Panel
  dirkpetervoss@bundeswehr.org +49 381 802-52838

NATO Staff Points of Contact:

- Mr Paul Beckley, NNAG Secretary (From Sep 18 – contact details TBD)
  Beckley.paul@hq.nato.int

Nr. 7	**NNAG / UWWCG**

1. Title of Proposed Study: Sonobuoy Secure Telemetry.

2. Brief Description of Proposed Study:

The proposed study will investigate options to protect the sonobuoy uplink and downlink.

3. Background:

Allied submarine and warship signatures are classified and are vulnerable to compromise by passive acoustic detection. NATO frequently trains against our own submarines and warships. Sonobuoy transmissions on the RF up-link to the receiving radio are passed as 'plain-text' making raw acoustic data available to anyone within the RF horizon of the sonobuoy. This creates an 'above water' vulnerability path, which could lead to the signatures becoming compromised. Additionally, the 'plain-text' RF uplink is vulnerable to spoofing, which could allow the masking of hostile target signatures, thus potentially compromising the ability to conduct Antisubmarine Warfare operations, and potentially providing a cyber security vector into aircraft and warship mission systems via the sonobuoy receiver.

Further to the above, many sonobuoys are now capable of being commanded via a 'plain-text' RF down-link. This creates a vulnerability path during operations that could allow hostile forces to reprogram or hijack the deployed sonobuoys, thus potentially further compromising the ability to conduct Antisubmarine Warfare operations.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

The objectives of the Study are to:

- Conduct a study of the NATO sonobuoy up-links and down-links.
- Assess the potential threats with the current 'plain-text' links.
- Conduct a study of potential encryption technologies that could be applied to the sonobuoy up-link and down-link and assess the compatibility and impact of each on the sonobuoy and the sonobuoy receiver.
- Make recommendations for the implementation of encryption for sonobuoy telemetry.
- Deliver a Final Report, releasable to NATO that covers Tasks 1-4.

5. NATO Priority:

This NIAG Study will contribute to the following NATO Priorities:

- DPPs
  a. Anti Submarine Warfare.
  b. Improved Maritime Engagement.

- NDPPs
  a. M7203N Anti-Submarine Warfare; Improve ASW capability.
  b. M6202N Survivability and Naval Force Protection.
  c. M7203N Improved submarine surveillance, detection, classification and neutralization.
  d. E7102N Joint Intelligence, Surveillance and Reconnaissance (JISR).
  e. M7204N Maritime Situational Awareness (MSA).

6. Intended Follow-on to the Study:

Development of an ANEP and a STANAG to ensure that interoperability is maintained.

7. Are any other NATO Bodies involved in the related area of work? None

8. Is there any current industrial involvement in the area of work?

There are no known national efforts specifically related to the encryption of the sonobuoy telemetry links, but there is lots of work related to the encryption of other RF links.

9. Proposed start date: Autumn / Fall 2019.

10. Desired completion date: Autumn / Fall 2020

11. Study Classification level: NATO SECRET.

12. Study Open to Partners?

Potentially open to Open to Australia, Japan, New Zealand and South Korea.

13. Sponsoring Group Point of Contact and IS Point of Contact:

Sponsoring Group Lead Nation = UWWCG MA Syndicate

Sponsoring Group Points of Contact:

Mr Scott Campbell, Interim Chairman UWWCG / MA Syndicate / Specialist Team on Sonobuoys, tel: +1-819-939-4093
scott.campbell@forces.gc.ca

Secondary: Cdr Jon Arild Brath Strandnæs, Chairman UWWCG - tel.:
j.strandnas@mil.no

NATO Staff Points of Contact:

- Mr Paul Beckley, NNAG Secretary
  Beckley.paul@hq.nato.int

Nr. 8 NAAG/JNLWCG

1. Title of Proposed Study:

Low-Collateral Damage C-sUAS Effectors Other than Jammers

2. Brief Description of Proposed Study:

Small Unmanned Aircraft Systems (sUAS) are an emerging and identified threat today. The need for a combination of effective Counter-sUAS (C-sUAS) capabilities has been identified by the NATO nations.

While jammers offer today the best current defeat options, many jamming opportunities were expected to be lost within some years due to the shift to autonomous or 5G-controlled flights.

This is why this study should identify and assess potential realistic solutions to defeat the threat while minimizing the collateral damage (defined as the remaining effect(s) of the effector(s) after interacting with the sUAS).

3. Background:

Currently there are about 35,000 commercial flights over Europe per day; in 2035, the forecast is about 20,000 flights (mostly sUAS) over a large city per hour. The establishment of a Countering Class I Unmanned Aircraft Systems (UAS) Practical Framework was agreed by the Council and endorsed by Defence Ministers during their meeting on 13-14 February 2019. Through this framework, NATO nations have recognized the challenge posed by small Unmanned Aircraft Systems (sUAS) and the need for a combination of effective C-sUAS capabilities, with Industry involvement, essential.

There is tasking from the NATO Army Armaments Group for non-lethal / low-collateral damage C-sUAS effectors to which the Joint Non-Lethal Weapons Capabilities Group (JNLWCG) is responding.

In 2018, NNTEX-18C, the NATO Non-Lethal Technology Exercise-2018-C-sUAS (organized under the DAT PoW umbrella and led by the USA) partially demonstrated actual low-collateral damage effectors including jammers, kinetic, and net capture solutions against s-UAS. Millimetre wave and RF/HPM directed energy systems were considered of great interest but were not demonstrated during the event.
The JCGGBAD, with excellent support of the NIAG and STO developed a significant knowledge base in this regard in the past years. However the threat is in constant development and the past work would need to be updated and expanded, especially with promising new technologies in the Non-Lethal/Low Collateral Damage Capabilities area.

sUAS are increasing in range, payload capacity, and autonomy (better able to sense and interact with the environment, including very precise manoeuvring even in a C2 and GPS-denied area).

This is why there is a strong need for Low-Collateral Damage (LCD) C-sUAS effectors other than jammers.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

This NIAG proposal requests Industry support in identifying and assessing potential solutions being available or soon-to-be available on the market.

Feedback and data provided by Industry on C-sUAS technologies (including anticipated utility/risks) will inform decisions on future NATO and National tests and exercises and which C-sUAS to exercise/assess, support range and spectrum approval processes, and contribute to NATO, member Nation, and partner understanding of costs, benefits, and risks thereby facilitating C-sUAS acquisition and employment. This will directly assist the JNLWCG and support the NATO Counter-UAS Practical Framework.

5. NATO Priority:

NDPP raises requirements for countering sUASs with low-collateral damage capabilities.

6. Intended Follow-on: Support to the NATO-wide efforts in countering UAS

7. Are any other NATO Bodies involved in the related area of work?

- NATO Practical Framework on C-UAV
- NATO ESCD DAT PoW
- NATO NAAG JCGGBAD
- NATO NAAG JNLW CG

8. Is there any current Industrial involvement with the Sponsor Group? No

9. Proposed start date: End 2019

10. Desired completion date: Mid 2021

11. Study Classification level: NATO Unclassified / Restricted if necessary

12. Study Open to Partners? yes (selected partners)

13. Sponsoring Group Point of Contact and IS/DI Point of Contact:

NAAG JNLWCG Chairman
Alexandre Papy, alexandre.papy@dymasec.be

NAAG Staff Officer
Osman Tasman, tasman.osman@hq.nato.int

Nr. 9 NNAG/UWWCG

1. Title of Proposed Study:

Overarching framework for Command and Control (C2) standards for multinational operations for maritime unmanned systems.

2. Brief Description of the Proposed Study:

This study will bring together an expert panel of military, industry, academic and the scientific community to examine and study how Maritime Unmanned Systems (MUS) operate and propose a C2 construct that can be used in multinational operations and incorporate previous or ongoing work by industry, military agencies (NATO, EDA, National Laboratories, etc.) and academia.

3. Background:

The NATO Naval Armaments Group (NNAG) Under Water Warfare Capability Group (UWWCG) Naval Mine Warfare (NMW) Syndicate identified a deficiency in NATO standards that does not address the C2 standards with unmanned maritime systems in a multinational environment.

The topic has been further relevance due to the NNAG focus on maritime operations in 2040 (MO 2040), and the specific initiative of MUS and its political focus.

4. Objective of the Study and what is expected to be delivered in the Final Study Report:

- Investigate how a C2 structure would work for maritime unmanned systems in a controlled water space management environment in a multinational construct;
- Explore standards aimed at underwater communications and data;
- Study the potential for incorporation of tools into TRITON;
- Explore how to secure tactical data exchange and any potential cyber security related threat;
- Evaluate any environmental impact and legal limitation in order to be able to operate also in a “dual use” scenario;
- Explore how to securely identify friendly operating UUW;

- Study any potential non-GNSS as an alternate Position Navigation and Timing (PNT) system onboard UUW; and
- Ensure standards meet all NATO nations' requirements.

5. NATO Priority:

As this study will address an established NDPP shortfall (NMW) it should be considered a high priority.

6. Intended Follow-on to the Study:

- Operating standards for maritime unmanned systems in a water space management environment; and
- Revised or new UWW doctrine.

7. Any other NATO Bodies involved in the related area of work:

- NCIA (Host Nation for the TRITON Project);
- MARCOM;
- NSO – MCMSB (MAROPS/NMWWG);
- ACT (CAPDEV/C2DS/OPSC2);
- STO CMRE;
- C2 CoE, Utrecht (NLD);
- NMW CoE, Oostende (BEL);
- CJOS CoE, Norfolk (USA);
- CoE CSW, Kiel (DEU); and
- CCD CoE, Tallinn (EST).

8. Current Industrial Involvement with the Sponsor Group:

None at this time

9. Proposed start date: March 2020

10. Desired completion date: March 2021

11. Study Classification: NATO Restricted

12. Study Open to Partners: Yes

13. Sponsoring Group Point of Contact and IS Point of Contact:

Sponsoring Group Point of Contact: LT Cdr Mark Dittrich,
CAN rep UWWCG
tel.: 1-819-939-3960
Mark.Dittrich@forces.gc.ca

IS Point of Contact:
Paul Beckley, Beckley.paul@hq.nato.int

Reserve 1	**LCMG/WG/3**

1. Title of Proposed Study: Tender Evaluation Matrix for Military Procurements

2. Brief Description of Proposed Study:

The Study "Tender Evaluation for Military Procurement" has the objective to provide analysis, recommendations, and a systematic approach for NATO nations, agencies and institutions to evaluate tenders for systems and capabilities effectively under certain parameters.

The cost of operating and supporting a system is, in most cases, significantly greater than the cost of acquiring it. For this reason, the post-acquisition costs have become an increasingly important component of the evaluation of potential contractors proposals.

Contractors are being required to provide data on expected support costs either as estimate figures or as contractually guaranteed cost figures. The evaluator, planner or procurement officer must determine when it is to their advantage to require a contractor to provide either estimated data or contractually guaranteed data.

Before a data requirement is imposed on the contractor, the procurement officer must determine the specific cost data required, the amount of detail necessary and the degree of accuracy desired.

The contractor incurs a cost increase when data must be contractually guaranteed. This cost is directly related to the level of risk inherit to the provision of such data. If the data is guaranteed and the guarantee can be enforced, then the procurement officer has relatively little analysis to do to confirm its accuracy; however, if the data is merely estimated, the procurement officers must then have the means of evaluating the data and determining its accuracy in their needs.

As a result, it is obvious that the techniques of life cycle costing can be used by the procurements officers as prime method for carrying out tenders evaluation.

The Study shall:

- Conduct a market survey of COTS products for tender evaluation available
- Analyse the necessary inputs of the tender process

- In corporate risk in regard to LCC
- Show interdependencies between cost-effectiveness and acquisition decision
- Examine legal aspects
- Deliver a decision support element (tree or IT tool) suggesting the most efficient tender
- Enable modification of tenders and prices to a common baseline
- Briefly explain the logic of the decision element
- Enable the tool to formulate questions and evaluate changes with respect to changes and specifications.

The following example shows the Greek approach to combine LCC and risk assessment to evaluate the most efficient tender and may give an impression of a part of the required result:

After the evaluation of the data accuracy which the potential tender has provided we are using a predefined Risk Cube to determine the mean value (μ) and variance (σ^2). Then we transfer them to the Evaluation Matrix (Picture 1).

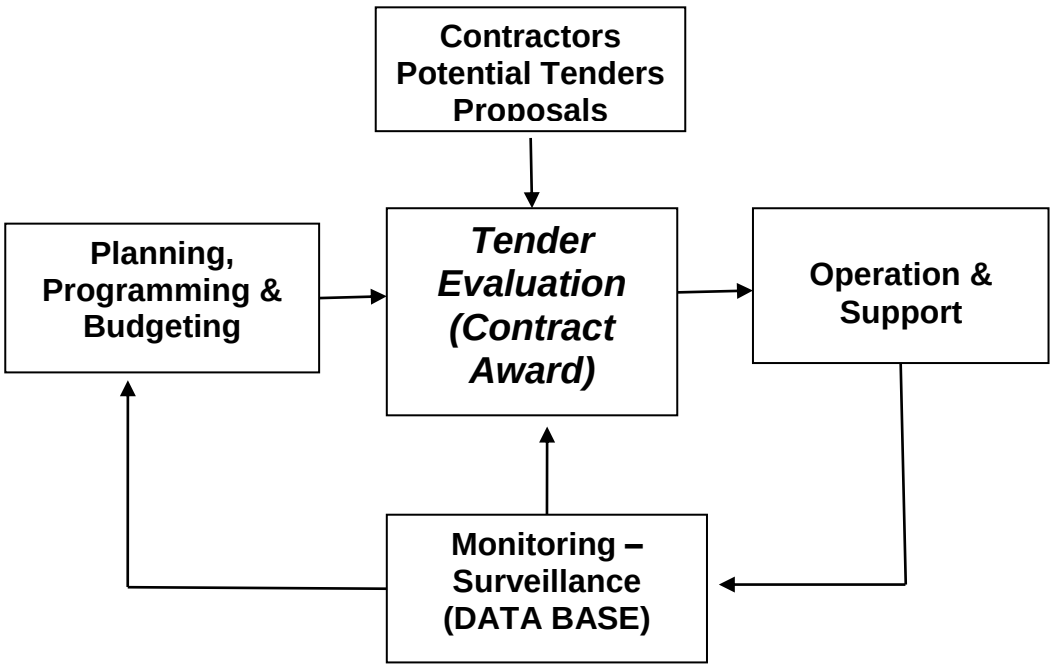
1° LEVEL (Depending Applicability)	2° LEVEL (Depending Applicability)	3° LEVEL (Depending Applicability)	Possibility (P)	Impact (I)	Risk Index (PXI)	Estimated Cost (C)	Risk Factor (RF)	Adjusted Cost μ (CXRF)	Uncertainty Variance (σ^2)
CONCEPT-DEVELOPMENT-PRODUCTION COST (C_1)	Project Management Cost($C_{1.1}$)		NO	NO	NO	NO	NO	NO	NO
	System Engineering Cost ($C_{1.2}$)		NO	NO	NO	NO	NO	NO	NO
	Design & Development Cost($C_{1.3}$)		NO	NO	NO	NO	NO	NO	NO
	Prototype Manufacture and Test & Evaluation Cost ($C_{1.4}$)		NO	NO	NO	NO	NO	NO	NO
	Publication Development & Data Packs Cost ($C_{1.5}$)		NO	NO	NO	NO	NO	NO	NO
PROCUREMENT COST (C_2)	Material Cost ($C_{2.1}$)	Units Cost ($C_{2.1.1}$)	UNLIKELY	MINOR	LOW	**1000**	**1,02**	**1020**	0,0002
		Administrative Cost ($C_{2.1.2}$)	VERY LIKELY	MAJOR	**HIGH**	**1000**	**1,25**	**1250**	0,031
		Participation Cost ($C_{2.1.3}$)	LIKELY	MEDIUM	**MODERATE**	**1000**	**1,10**	**1100**	0,005
	Initial Support Cost ($C_{2.2}$)	Initial Spare Parts Cost ($C_{2.2.1}$)							
		Initial Tool Cost ($C_{2.2.2}$)							
		Initial Training Cost ($C_{2.2.3}$)							
		Data Cost ($C_{2.2.4}$)							
	Infrastructure Cost ($C_{2.3}$)	New Buildings Cost ($C_{2.3.1}$)							
		New Infrastructure Cost ($C_{2.3.2}$)							
	Ammunition Cost ($C_{2.4}$)								
OPERATION & SUPPORT COST (C_3)	Personnel ($C_{3.1}$) INDIRECT-VARIABLE COST	Operational Personnel ($C_{3.1.1}$)							
		Maintenance Personnel ($C_{3.1.2}$)							
		Support Personnel ($C_{3.1.3}$)							
	Consumables ($C_{3.2}$) DIRECT COST	Fuel ($C_{3.2.1}$)							
		Lubricants ($C_{3.2.2}$)							
		Training Ammunition Cost ($C_{3.2.3}$)							
						C		μ_{TOC}	σ^2

Expected $TOC_{80\%}$ = NORMINV (0.8, μ_{TOC} , σ)

Picture 1

3. Background:

The process of acqusistion of military systems for capabilities includes analysis and actions in different disciplines. Requirement management, technical evaluation, cost management, risk management and furthers combine to an comprehensive and holistic evaluation task. At the end a decision has to be made and one solution will have to be selected. With this selection the demander determines himself for years or decades. To make sure his decision reflects all important parameters and does not lead to a misdetremination, the process of tender evaluation has to lead into a successful acquisition.



$$\text{Life Cycle Effectiveness} = \frac{\text{Life Cycle Performance}}{\text{LifeCycleCosting}}$$

Will be beneficiary the development of study creating a methodology bringing potential tenders in an easily comparable base, following the rule “Contracting authorities shall base public contracts on the most economical tender”.

The study shall regard existing documents and directives by other nations and organizations. For example:

EU Directive 2014/24/EU Article 92 (2), Award Criteria

To identify the most economically advantageous tender, the contract award decision should not be based on non- cost criteria only. Qualitative criteria should therefore be accompanied by a cost criterion that could, at the choice of the contracting authority, be either the price or a cost- effectiveness approach such as life-cycle costing. However, the award criteria should not affect the application of national provisions determining the remuneration of certain services or setting out fixed prices for certain supplies."

EU Directive 2014/24/EU Article 93 (1+2), Life Cycle Costing

„[…] It should hence be made clear that, except where it is assessed on the basis of price only, contracting authorities can determine the most economically advantageous tender and the lowest cost using a life-cycle costing approach. The notion of life- cycle costing includes all costs over the life cycle of works, supplies or services.
„This means internal costs, such as […] development, production, transport, use, maintenance and end-of-life disposal costs but can also include costs imputed to environmental externalities[…].

EU Directive 2009/81/EU Article 47 (1), Award Criteria

Without prejudice to national laws, regulations or administrative provisions concerning the remuneration of certain services, the criteria on which the contracting authorities/entities shall base the award of contracts shall be either:
"(a) when the award is made to the most economically advantageous tender from the point of view of the contracting authority/entity, various criteria linked to the subject-matter of the contract in question: for example, quality, price, technical merit, functional characteristics, environmental characteristics, running costs, lifecycle costs, cost-effectiveness, after-sales service and technical assistance, delivery date and delivery period or period of completion, security of supply, interoperability and operational characteristics […]".

4. Objectives of the Study:

The Study "Tender Evaluation Matrix for Military Procurement" has the objective to help NATO decision makers (Procurement Officers) to evaluate tenders in determining whether or not any of the proposed alternatives solutions offer sufficient operational and/or economic benefit to be worth the cost. As a general rule the preferred alternative is the alternative that provides the greatest amount of benefit in relation to its cost.

5. NATO Priority: COMMON

6. Intended Follow on to the Study:

7. Other NATO Bodies Involved in the Related Area of Work:

8. Current Industrial Involvement with the Sponsor Group:

9. Proposed Start Date: February 2020

10. Desired Completion Date: December 2020

11. Study Classification: UNCLASSIFIED

12. Study Open to Partner industries: YES

13. Final report releasable to: NATO-,PfP- and partner Nations, NATO Agencies and Institutions

14. Sponsoring Group Point and IS Point of Contact:

Reserve 2 NNAG/SDCG

1. Title of Proposed Study:

Practical Application of Water Mist to Mitigate Weapon Effects

2. Brief Description of Proposed Study:

Water mist is known to be effective in mitigating weapon effects such as air blast (overpressure), fires, and thermal loading. The use of currently available fitted water mist systems to mitigate weapon effects is poor. This is due to the lag time between activation and the compartment being filled with mist. This study will focus on the following key areas:

a. Use of the platform close in weapon system sensors and the like to determine where the weapon system is likely to impact the platform and therefore activate only the required water mist sections, and

b. Development of a distributed water mist system that can both mitigate the air blast as well as secondary fires.

This study would initially focus on the following:

a. Triggering of the water mist system:
   i. The ability to use the close in weapon system sensors to determine where the air borne threat is likely to strike the platform and activate the system, and
   ii. Use of internal sensors to activate the system, as done in armoured vehicles.

b. Consequence analysis:
    i. The uncertainty in the actual hit position of the air borne threat may give rise to unrequired mist releases. The consequence of this is unnecessary wetting of spaces to be weighed against the added safety from water mist blast mitigation and fire suppression / extinguishment. The effect of the mist on electronic equipment and the like needs to be addressed. Furthermore, water mist flooding, visibility hampering and other drawbacks that may become apparent from the review needs to be considered.

c. Understanding and optimising blast mitigation:
    i. Water mist parameters relevant to blast attenuation, fire extinguishment, and compartment air temperature reduction, and
    ii. Use of additives to enhance water mist system ability to achieve the desired outcome and increase water flow rate within the pipe work.

d. Implementation:
    i. Selection of spaces to be fitted with water mist blast suppression systems,
    ii. Modifications to (initiation of) water mist systems,
    iii. Efficiency of existing water mist firefighting systems as blast mitigation means, and
    iv. Localised water mist systems using compressed air or nitrogen to support rapid discharge.

e. DC&FF Management:
    i. The new technology may require modifications to the damage control organisation, procedures, and ship command. We need to develop doctrines for how to act in hostile situations or extreme incidents of any other kind. Much of the effort will go into interviews with knowledgeable navy personnel to assess current doctrines, understand the logic and develop new doctrines incorporating explosion suppression. Furthermore, it is advised to publish and present the technology, operation and management to relevant communities (Navies, Industry) through seminars and workshops soliciting valuable feedback from other nations on the technology and the concepts.

The outcome of this review will drive the development and testing portion of this study. Initially it is expected that portions of the system would be tested, i.e. the ability of the close in weapon systems to predict the impact zone on the platform and that the water mist system is both able to attenuate the air blast as well as extinguish secondary fires. Then a complete system test would be required to be undertaken to validate the developments. These outcomes are to be documented to support the production of a STANREC.

3. Background:

This NIAG study will be focused on reducing the impact of weapon detonation within a naval platform by the use of water mist. Weapon effects will be cataloged around the loading density[3].

By 2000, it was recognized that air blast waves generated by a denotation could break up water droplets into a micro-mist and then lead to rapid evaporation. The outcome of this was a reduction in the weapon effect on the structure, via a reduction in the Quasi-Static Pressure (QSP). This mechanism of air blast wave reduction from water mist is less effective for a deflagration event.

In 2010 a test program based around a compartment with a volume of 225 m^3 using an explosive charge.

In the compartment there were two sets of 10 Marioff nozzles. The water mist system used the Marioff nozzle 4S 1MC 8MC 1000.

Table 1 initially gives the test matrix configurations. The water mist reduced the nominal temperature from 625°C to 125°C. Table 1 then presents the peak blast pressure, blast impulse pressure, and QSP. The results shows that blast impulse and QSP are reduced the most, which implies the greatest potential to reduce structural damage.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

If an effective water mist system, which can mitigate weapon effects, can be developed and implemented on NATO maritime assets it would provide the following benefits:

1. Make maritime platforms less vulnerable to internal weapon denotation,
2. Allow for composite structures to reach blast resistant levels comparable to steel structures without this protective water mist system,
3. Response to weapon effects within a platform more effectively with the available crew members,
4. Enhance the performance of other ballistic protection (structural) system so that the platform can survive a large range of threats,
5. Reduce the risk of fire after an explosion,
6. Enhance overall platform fire fighting capabilities, and
7. Increase the safety of crew.

[3] Loading density is the weight of explosive (TNT equivalent) to the volume of the compartment.

Table 1: Air blast modification due to water mist or wet walls

Tests	Estimated water mist in the air [l]	Charge mass [kg]	Dry/ Water Mist / Wet Walls	Peak blast wave pressure		QSP	
				Average (MPa)	Mitigation	Average (MPa)	Mitigation
1A	-	23.6	Dry				
1B	-	23	Dry				
2	~100	23.5	Water Mist	4.2	-37%	103	-49%
3	~100	23.5	Water Mist	3.7	-44%	100	-50%
4	~80	23.5	Water Mist	6.4	-4%	143	-29%
5	0	23.5	Wet Walls	4.6	-30%	163	-19%
6	-	23.5	Dry	6.7	-	200	-

5. NATO Priority: Combat Survivability

6. Intended Follow-on to the Study: Development of a STANREC by the lead on water mist system requirements to achieve weapon effect mitigation.

7. Are any other NATO Bodies involved in the related area of work? Not directly

8. Is there any current Industrial involvement with the Sponsor Group? No, but Marioff, Atlas Elektronik, and Damen Schelde Naval Shipbuilding have all expressed an interest in supporting this NIAG.

9. Proposed start date: July 2019

10. Desired completion date: 24 months after commencement of the study

11. Study Classification level: NATO Secret Releasable to Australia, Sweden, and Finland

12. Study Open to Partners? Yes

13. Sponsoring Group Point of Contact and IS/DI Point of Contact:

NNAG / SDCG Chair: Mr. James Harrison, James.Harrison2@navy.mil

ST-Ship Combat Survivability (SCS): Chair: Mr. Ben Pedersen
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Task lead: Mr. Ian Raymond

IS/DI: Mr Paul Beckley Beckley.paul@hq.nato.int

Reserve 3	**NNAG/JCGUAS**

1. Title of Proposed Study:

Unmanned Aircraft Systems (UAS) Airworthiness, Assessing Acceptable Risk to Third Parties.

2. Brief Description of Proposed Study:

The Joint Capability Group for Unmanned Aircraft Systems (JCGUAS), Airworthiness Specialist Team, has faced challenges in establishing UAS airworthiness standards that provide an acceptable level of risk to third parties on the ground. This study would identify and evaluate potential methods and airworthiness standards for military UAS to provide an acceptable level of safety to third parties on the ground.

This study would include assessment of current manned civil and military air systems, design standards, and the inherent level of safety for third parties they provide. The study should consider risks to third parties on the ground resulting from both non-inherent and inherent (design controllable) air system failures. The study should propose a method(s) by which UAS airworthiness minimums may be more effectively defined for UAS operations for incorporation in NATO UAS airworthiness standards.

3. Background:

NATO UAS Policy recognizes that UAS qualify as International Civil Aviation Organization (ICAO) state aircraft when operated by states or, as in the case of NATO, when operated by a state's military forces. The purpose of state aircraft is to serve the nations' public welfare in missions to include humanitarian-relief, law-enforcement, search & rescue and, most importantly for NATO, the full spectrum of military missions. As state aircraft, the each state has the sovereign authority to certify airworthiness of their aircraft, having common standards serves interoperability of forces. Certifying authorities may utilize civil standards, or adapt or apply military standards independent of civil authorities.

NATO UAS Policy states the objective that alliance UAS achieve operations flexibility, responsiveness, and freedom of navigation comparable to manned aviation. Having alliance agreed standards of airworthiness supports attainment of this objective. NATO policy for UAS military airworthiness standards should account for the fact that the UA has no persons on board, and therefore primary airworthiness considerations are risk to third parties on the ground that would include UAS crew, and ground staff.

NATO Airworthiness Policy states, “Military and other state aircraft operate independent of the regulatory framework that civil aircraft must adhere to.” This policy further recognizes that, “Even though the ICAO regulations do not apply to state aircraft they explicitly require member states to have due regard for the safety of navigation of civil aircraft when issuing rules, regulations and standards.” Therefore, NATO policy holds that for aircraft operating in alliance missions, “airworthiness is about achieving an acceptable level of safety.”

The JCGUAS mission includes establishing and maintaining standards to support NATO UAS policy. The subgroup, “UAV Systems Airworthiness Requirements” (USAR) Specialist Team (USAR ST), has the delegated role to develop and maintain UAS airworthiness requirements that represent the comparable minimum level of airworthiness for manned aircraft that operate in non-segregated airspace over all population densities. As such, alliance UAS airworthiness requirements should have sufficient rigor to be accepted across the boundaries of NATO nations just the same as manned civil and military aircraft.

The USAR ST has completed development and achieved ratification of two editions of STANAG 4671. The most recent, Edition 2, was promulgated February 2017, and provides the current baseline alliance standard ratified by most alliance nations that employ military UAS today.

In the history of the development of STANAG 4671, the most discussed section has been, Acceptable Means of Compliance (AMC) 1309, a section that establishes overall system-level safety standards and means of compliance for UAS. Although AMC 1309 is a means of compliance, the section is critical because it establishes the essential level of safety called for by the standard, and one that can be compared to civil and military aircraft. It establishes the airworthiness requirements that provide the minimum acceptable level of safety to third parties on the ground.

In application, this study will inform policy makers in determining the acceptable level of safety for design and development as unmanned aviation takes on an increasing role in alliance air forces. Specifically, this study will consider that manned aircraft airworthiness requirements were historically developed under the premise that a catastrophic failure would result in loss of life to persons on-board the aircraft, and that this premise is no longer valid for UAS operations, since the risk is shifted only to 3rd parties on the ground, whereas a catastrophic failure does not guarantee a resultant loss of life.

4. Objectives of the Study and what is expected to be delivered in the Final Study Report:

- Assess and characterize manned civil and military aircraft risk to third parties on the ground resulting from inherent (design controllable) and non-inherent (non-design controllable) failures that can result in 3rd party fatalities on the ground. Manned civil and military aircraft mishap data may be used to inform this assessment. Identify UA characteristics such as size, weight, kinetic energy and/or complexity that affect risk to 3rd parties on the ground.

- Identify and compare candidate standards that define and quantify 'acceptable level of risk to third parties on the ground.' Provide recommendations on use of these third party risk standards to establish UAS airworthiness standards.
- Identify and compare candidate UAS airworthiness standards and means of compliance that provide an acceptable level of safety to third parties on the ground. Provide an assessment of whether UAS safety targets (such as "Pcumcat" (the cumulative probability at UAV System level, the combination of all Catastrophic failure conditions)) should scale with maximum gross takeoff weight and/or other UA attributes (such size, kinetic energy and/or complexity) over the weight range from 150 kg to 20,000 kg that is addressed by STANAG 4671. Provide rationale for recommended weight break-points, if any.
- Assess the extent to which the STANAG 4671 AMC 1309 Pcumcat safety target and means of compliance provide an acceptable level of risk to third parties on the ground over the weight range from 150 kg to 20,000 kg. Assess whether Pcumcat should be defined as a function of takeoff gross weight and/or other attribute to provide an acceptable level of risk to third parties on the ground for UAS ranging from 150 kg to 20,000 kg takeoff gross weight. .
- For UAS that are not designed or qualified to NATO USAR, identify methodologies, standards and means of compliance to assess risk to third parties on the ground.

5. NATO Priority:

- NATO UAS Policy.
- Intelligence Surveillance & Reconnaissance (ISR) Collection Capability.
- Allied Ground Surveillance (AGS).

6. Intended Follow-on to the Study:

- Support for follow-on editions of STANAG 4671.
- Support for follow-on editions of other airworthiness STANAGs such as STANAG 4702.

7. Are any other NATO Bodies involved in the related area of work?

- Science and Technology Organization, Applied Vehicles Technology (AVT) Panel 273, "Approval of RPAS Operations: Airworthiness, Risk-based Methods, Operational Limitations"

8. Is there any current industrial involvement in the area of work? None

9. Proposed start date: Autumn 2019 / Spring 2020

10. Desired completion date: Autumn 2020 / Spring 2021

11. Study Classification level: NATO UNCLASSIFIED

12. Study Open to Partners? PFP AUS ISR

13. Sponsoring Group Point of Contact and IS Point of Contact:

Sponsoring Group Lead Nation = JCGUAS Airworthiness Specialist Team

Sponsoring Group Points of Contact:

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Reserve 4 C3B (recommended ACT funds)

1. Title of Proposed Study:

Introduction of Data Centric Security (DCS) for enhanced sharing, protection and control of NATO data assets.

2. Brief Description of Proposed Study:

In order to guide development of the DCS Implementation Plan, as described in the DCS Vision and Strategy, and assess the feasibility, risks and benefits of DCS for implementation in the NATO Enterprise and the Alliance Federation NATO seeks industry advice on how this evolution may be achieved.

This Study will review the objectives of the DCS Vision and Strategy, and the transitions that will need to be addressed within the Alliance to ensure continuing Information Superiority.

The following aspects are the primary focus of the study:

(1) NATO Enterprise readiness to transition to DCS (identification of specific challenges, constraints, dependencies and how to address them);
(2) Reflect NATO and Alliance resource implications to evaluate how NATO and the nations maintain interoperability in accordance with individual national requirements;
(3) Identify activities for the development of the DCS Implementation Plan illustrating those activities that can be conducted in parallel;
(4) Realistic timelines for DCS implementation and the factors that influence this; and,
(5) Include both static and deployed environments.

3. Background:

See DCS Vision and Strategy.
See detailed description of Maturity Level (DCS1) features and objectives (to be issued)

4. Objectives of the Study:

Enable NATO to implement the DCS features and achieve the benefits of a standard-based approach.

5. Please indicate whether you would like to be presented with alternative solution options, taking into consideration that exploring various options may reduce the depth of the study scope:

Yes

6. NATO Priority:

High, because a clear implementation plan, different on-going NATO common funded projects may design and procure initial DCS-1 building blocks in a non-coherent way.

7. Intended Follow on to the Study:

The DCS Vision and Strategy identifies three major Maturity Levels. The intent is to develop the DCS Implementation Plan iteratively addressing each Maturity Level. Potential follow-on efforts will further focus on future Maturity Levels (DCS-2 and DCS-3), the transition between Maturity Levels and may also incorporate assessments of technical feasibility, interoperability and adoption by the NATO Enterprise and Alliance Federation.

8. Other NATO Bodies Involved in the Related Area of Work:

Several NATO and Partner nations are involved with the ongoing activities through ACT-sponsored TIDE and CWIX events. Within the C3 Board Substructure, the Capability Panels for CIS (CaP 1) and Information Assurance and Cyber Defense (CaP4) are closely following this work.

Also, the FMN Capability Planning Working Group (CPWG) is identifying potential architectures and standards for Coalition-wide data centricity as part of the FMN Roadmap.

Several nations have developed and are implementing data centric strategies independently.

9. Current Industrial Involvement with the Sponsor Group:

Industry has been involved through the ACT-sponsored TIDE and CWIX activities. A list of these entities can be provided.

10. **Proposed Start Date:** January 2020

11. **Desired Completion Date:** December 2020

12. **Study Classification:** NATO Unclassified

13. **Study Open to Partner industries:** Yes

14. **Final report releasable to:** Interoperability Platform (IP)

15. Sponsoring Group Point and IS Point of Contact:

NHQC3S / Jean-René Couture