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SUBJECT: **REPORT FROM THE FFAO WORKSHOP, STAVANGER, NORWAY**

DATE: 1 NOV 2017

1. Supreme Allied Commander Transformation (SACT) is pleased to report the findings of the Framework for Future Alliance Operations (FFAO) workshop held in Stavanger, Norway from 3-5 October 2017.

BACKGROUND

2. The FFAO is one of the key components of the Alliance's Long Term Military Transformation (LTMT) Programme. This programme serves to create a shared understanding of the future operating environment and to describe its potential military implications for the Alliance to inform the NATO Defence Planning Process (NDPP).

WORKSHOP SUMMARY

3. The FFAO workshop was a two-and-a-half-day working-level event held at the Joint Warfare Centre (JWC) which brought together 87 participants from 18 Nations (15 NATO & 3 Partner Nations), NATO Commands and Agencies, 16 Centres of Excellence (COEs), European Committee and Defence Agency, think tanks and academia. The primary deliverable for this conference were the recommended changes to the draft Chapter 3 of FFAO 2018.

4. The workshop began with a plenary session for introductory remarks, discussion of workshop concept and objectives, survey results, and discussion of applicable lessons learned. Then the workshop participants broke down into small syndicates for facilitated syndicate work to address the core question: *In 2035 and beyond, what abilities will NATO forces require in the areas of prepare, project, engage, sustain, C3, protect, and inform in order to accomplish NATO core tasks?* The first day concluded with a brief icebreaker event. The second day of the workshop began with a plenary session on SAS-123 brief panel followed by continued syndicate work. The last day consisted of out-briefs and discussion commencing in a plenary session. Closing remarks from COL Szabo concluded the workshop around noon.

WAY AHEAD

5. The Long-Term Military Transformation Programme will continue with the aim of completing the FFAO in 2018. Moving forward, the FFAO team will incorporate the

recommended changes into the draft Chapter 3 of the document. In October 2017, this document will be submitted for full staffing and review, followed by Bi-SC review in early 2018.

6. Workshop files and annuncements concerning future events are posted on the ACT website: http://www.act.nato.int/futures-work. Should there be any questions, points of contact are COL Tibor SZABO, (tibor.szabo@act.nato.int) and LTC Aaron BAZIN, (aaron.bazin@act.nato.int) for FFAO matters.

William B. Hickman
MAJOR GENERAL, USA
DCOS Strategic Plans and Policy

ENCLOSURE:

1. Framework for Future Alliance Operations (FFAO) Workshop Report.

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FRAMEWORK FOR FUTURE ALLIANCE OPERATIONS (FFAO) STAVANGER WORKSHOP REPORT

1. Background.

a. Overall task: To address the question - In 2035 and beyond, what abilities will NATO forces require in the areas of prepare, project, engage, sustain, C3, protect, and inform in order to accomplish NATO core tasks?

b. Desired Outcome: Refinement of the draft Chapter 3 of the FFAO.

c. Process: Pre-conference survey to establish baseline perceptions (quantitative) and a focus group table-top discussion (qualitative) with subject matter experts

d. RATIONALE: Through full participation and sharing responsibility, the groups develop mutual understanding, and inclusive solutions for NATO forces in 2035 and beyond

e. Time: Three days.

2. Participants.

a. Total Attendees: 87

b. ACT (including SEE & STRE): 24

c. ACO (including LCC, MCC): 3

d. Member Nations: 29

e. Partner Nations: 6

f. COEs: 20

g. EU: 2

h. OTHERS: 3

3. Findings. The syndicate workshop groups discussed and refined the following list of abilities statements for inclusion in Chapter 3 of the FFAO, *Military Implications:*

a. Inform.

(1) Collection - Capable of the exploitation of sources by collection agencies and the timely delivery of the information obtained to the appropriate processing unit for use in the production of intelligence and situational awareness.

(a) Ability to collect timely information via ISR.

(b) Ability to collect from multi-intelligence sources from alternative origins (commercial, private, national).

(c) Ability to detect and identify targets despite technological advances in stealth, camouflage, concealment and deception techniques, especially in virtual (cyber), urban and subterranean environments.

(d) Ability to collect from open-sources and social media.

(e) Ability to detect influence activities, especially in the early stages of development.

(f) Ability to develop and maintain a recognized information picture, including cyber.

(g) Ability to maintain an awareness of NATO cyber capabilities and vulnerabilities.

(h) Ability to develop and execute a cyber-intelligence collection plan to gain situational awareness of the cyber environment.

(i) Ability to monitor cyber areas of interest, to detect cyber attacks and cyber espionage against NATO systems.

(j) Ability to conduct cyber forensics to attribute actions to their sources.

(k) Ability to rapidly detect "anomalies" in the activities that occur in the global commons, physical or virtual on lines of communication, and at choke points.

(l) Ability to use automated processes to collect data.

(m) Ability to use cost effective technology including autonomous and disposable assets, remote sensors, and intelligence networks to enable early warning.

(n) Ability to (train and) cultivate human sources of information.

(2) Processing - Capable of receiving, converting and fusing data and information from all available sources into relevant and usable intelligence/knowledge, decision-support and situational awareness products by collation, evaluation, analysis, integration and interpretation through fusion and collaboration.

(a) Ability of NATO Indicators and Warning Systems to better identify the early phases of a crisis and enable timely decision-making.

(b) Ability to access and analyse data, and share intelligence cross domains at the strategic, operational, and tactical levels.

(c) Ability to use advanced technological methods, including artificial intelligence, virtual reality, modelling, and simulation to enhance the comprehensive preparation of the operational environment and maintain a single repository of knowledge.

(d) Ability to analyze large amounts of structured and unstructured data (big data). Ability to leverage regional experts to support intelligence collection, liaison, education, and training at all times, including via reach-back. (Move to a general category)

(e) Ability to exploit multi-intelligence sources from alternative origins (commercial, private, national).

(f) Ability of NATO to take a collaborative approach to intelligence sharing and may include intelligence exchange, common databases, network knowledge, forensics and biometrics to detect unconventional threats.

(3) Dissemination - Capable of distributing timely data, information, intelligence and specialist and all-source analysis, in an appropriate and accessible form, across and between networks as required.

(a) Better customize products, including visualization, for individual users (including the Internet of Things- IOT)

(b) Ability of users including IOT to "pull" information.

(4) General. Ability to develop agreements, legal frameworks, policies, and principles to leverage nations' military and non-military expertise together with relevant actors, partners, and entities in areas such as collection, processing, and dissemination of intelligence amongst stakeholders.

b. Project.

(1) Mounting – Need to project operationally agile and adaptable joint forces capable of conducting the full spectrum of operations concurrently across all core tasks of the Alliance.

(a) NATO forces should be able to mobilize and mount joint forces in the presence of instability situations within their own territory.

(b) Ability of NATO forces to maintain access to, and use of land, sea, air, cyber, space (including ability to launch), and information environments.

(c) Ability to mount and project joint forces at range onto land, to gain lodgements where necessary, by means of a broad array of theatre entry options including forcible entry, in an area of potential instability, in the most challenging environment.

(2) Deployment and Redeployment – Ability to move troops or equipment to a place or position for military action.

(a) Ability to deploy, sustain, and redeploy credible joint forces where and when needed.

(b) Ability to guarantee access to sufficient and resilient strategic lift, including air, sea, and other technologically available solutions.

(c) Ability to rapidly project advance forces and force liaison capabilities iyn order to project physical presence and influence into multiple areas of operations.

(d) Ability of NATO to leverage civilian expertise, including critical enablers and civilian crisis response teams, to facilitate and enhance NATO deployment/redeployment.

(3) Reception and Staging – Need to plan and provide reception, staging, and onward movement and integration facilities (in concert with host nations) to support the timely transition of deploying forces including personnel, equipment, and materials. Includes both expeditionary operations and operations on NATO territory.

(a) Ability to work with members, partner nations, and non-NATO entities to provide robust and flexible reception and staging.

(4) Basing – Need to establish and maintain a sufficient network of enabling infrastructure, bases, logistics and other support facilities on NATO territory and expeditionary bases, ports, and airfields in remote locations.

(a) Ability to rapidly repair ports and airfields, and return them to an operational status.

c. Engage.

(1) Joint Manoeuvre.

(a) Ability to provide an enhanced common operating picture (including aerospace, maritime, land, space, cyber, information, etc.) in real-time.

(b) Ability of NATO forces to manoeuvre jointly to gain advantage over the adversary.

(c) Ability of NATO forces to maintain access to the global commons and conduct the full range of operations where needed.

(d) Ability of forces to be mobile and able to operate across all domains, in the global commons, and in different terrains including arctic, littoral, and urban, at the lowest possible military organizational level.

(e) Ability to conduct geographically dispersed operations across a larger geographical area with a minimum of personnel and equipment.

(f) Ability to conduct distributed operations with enhanced manoeuvrability including all necessary enablers, such as military engineering support, tactical air transport assets, long range communications, and agile logistical support.

(g) Ability to engage in the full spectrum of cyber operations in order to maintain freedom of action and influence in all areas of cyberspace, including new and emerging cyberspace areas.

(h) Ability to quickly project forces to uncertain or contested environments with low visibility and small footprints.

(i) Ability of NATO forces to adapt to a wide range of conditions from full host-nation support to austere environments.

(j) NATO forces should be able to operate across all domains and succeed in hostile anti-access and area denial environments.

(2) Joint Effects - Kinetic

(a) Ability of NATO forces to coordinate the efficient application of lethal and non-lethal joint effects to deny, degrade and destroy adversary forces, facilities, and infrastructure throughout the operational area thus enabling decisive manoeuver whilst avoiding unwanted collateral effects.

(b) Ability to maintain and use a broad range of conventional capabilities while taking advantage of new technologies which might enhance their effects.

(c) Ability to use precise, discriminatory systems to deliver effects, including at long range, independent of external infrastructure.

(d) Ability to field standardized munitions that can be employed for different national platforms and systems.

(e) Ability to develop and take advantage of lower cost per shot weapons such as directed energy.

(f) Ability to perform kinetic operations in urban or densely-populated areas with minimum possible collateral damage.

(g) Ability to mitigate numerical inferiority by being able to accurately delivery fires in close coordination with friendly forces delivering the desired effects at the proper time and place.

(h) Ability to maintain a robust, networked targeting capability able to leverage persistent, discriminatory sensors in order to enable enhanced collateral damage estimates, and direct the use of precise kinetic or non-kinetic effects across all domains.

(i) Ability of the Alliance to obtain and employ scalable and multi-role weapons to cover a broad range of mission types.

(j) Ability to vary weapons yield post launch to change their effects from non-lethal through kinetic and to change targets in flight.

(k) Ability to conduct precise and timely Battle Damage Assessment to demonstrate transparency where necessary, and support follow-on actions.

(l) Ability to maintain freedom of action in the electromagnetic spectrum.

(m) Ability to have access and use advanced electromagnetic protection, electromagnetic support, and electromagnetic attack.

(n) Ability to innovate and invest in new technologies to improve engagement capabilities.

(o) Ability to exploit remotely-controlled, automated, and autonomous systems.

(3) Joint Effects - Non-Kinetic

(a) Ability to coordinate timely communications activities using all available channels in support of Alliance operations.

(b) Ability to integrate and synchronize information activities to create effects on perceptions, and shape opinions and decision making.

(c) Ability of NATO military forces to work with other actors to provide the military contribution towards a comprehensive approach, promoting internationally-accepted norms, such as gender and building integrity.

d. Consult, Command, Control.

Requests for this chapter:

- Define C3 as a capability versus C3 as a system.
- Define what is ''mission command'' and find where is the best place to put it in the chapter III.
- Role/Responsibility/Authorithy do we need to talk about it in connection with mission command?

(1) Future C3. Ability of the Alliance to possess resilient and interoperable C3 systems.

(a) Ability to observe, orientate, decide and act across all domains in a full integrated comprehencive manoeuvre.

(b) Ability to optain electromagnetic dominance.

(c) Ability to obtain dominance into the info-sphere and in the online world.

(d) Ability of C3 to Integrate in a high speed process operational and environemental big datas.

(e) Ability to develop a full operational and environemental situation awareness.

(f) Ability to assist leaders in decision making process.

(g) Ability to rapidly make sense of complex problems and support planning process and course of action development with the risk assement associated.

(h) Ability to develop a full spectrum joint targeting and engagement list in a high speed loop process.

(i) Ability to act and conduct all domains operations in real time.

(j) Ability to authority in charge to deliver decision of engagement everywhere at anytime.

(k) Ability to do real time battle assessment.

(l) Ability to automatically and seamlessly transfer vital C3 functions to backup systems via pre-determined alternate paths when C3 is degraded.

(m) Ability of C3 to operate as segregated backup systems or stand alone systems when required.

(n) Ability of C3 to autonomously re-enable following denial or disruption.

(o) Ability of C3 to utilize communications pathways that are reliable, robust, secure and have alternate and backup communications systems available.

(p) Ability of C3 to develop flexible communication capabilities with operational and non-operationnal partners from individual, academic, industrial to gouvernementals entities.

(q) Ability of C3 systems to support flat organizations structures and accelerate decision making by scalable and modular units.

(r) Ability of C3 systems to support real time reach-back to connect experts and senior leaders to geographically separated units operating with smaller and flatter organizational structures.

(s) Ability to accomplish missions in case of total C3 system failure.

(t) Ability to maximise human capital to make people confortable with modern C3 structure in mission command capable approach.

(2) Future Decision-Making and Information Processing Tools - Ability of C3 systems to support mission command style decision making and assist leaders in achieving clarity concerning complex problems through automated analysis and decision-making tools.

(a) Ability to synchronize in a fast process the different levels of war in their observation,orientation, decision action loop.

(b) Ability to connect and interact with the political level.

(c) Ability to develop specific POL/START decision making doctrine.

(d) Ability to educate political level to military planification process.

(e) Ability to develop best BI-SC military advise.

(f) Ability to generate high level rank staff officer able to interact and advice polical level.

(g) Ability of C3 systems to support senior leaders as they seek to achieve a comprehensive understanding of the operational environment including culture, ethnicity, religion and other considerations such as diplomatic information and economic issues.

(h) Ability of C3 systems to support the secure collection, storage and distribution of Alliance information.

(i) Ability to develop advanced pre-planning immediate inter-domaine action plan from low to high level of engagment.

(j) Ability of C3 systems to support the transmission of orders/information across multiple security domains (i.e. to NGO, others).

(k) Ability of Alliance systems to support in an easy way member nation access to the information necessary to execute their duties as well as to possess an in-depth understanding of the orders and authorizations required to execute Alliance operations.

(l) Ability to mitigate the use of disruptive technologies in future C3 organization and system development.

(m) Ability to balance human and autonomous system in the decision making process.

(n) Ability to use wargaming – simulation-modeling to support decision making.

(3) Actor Integration and C3 - Ability of the Alliance to coordinate elements of both military and non-military power through an increasing number of actors.

(a) Ability of C3 systems to support a collaborative environment and the sharing of information with trusted actors and to be able to handle different classifications to meet mission requirements.

(b) Ability of Alliance C3 systems to facilitate coordination and build trust across local government, non-government and international organizations, as well as businesses and key individuals.

(c) Ability of Alliance C3 systems to enable communications/consultation amongst all actors and accommodate timely interaction to achieve mutual objectives.

(d) Ability to develop mutual understanding.

(e) Ability to develop a social organization mapping of actors and partners link with the alliance.

(4) Integrated Command Control and Consultation - Ability of C3 systems to provide robust Strategic Awareness and a persistent operational picture across all domains.

(a) Ability of C3 to integrate command and control and conduct continuous surveillance from multiple arrays of sensors, and fuse data and information about the area of operations into an integrated operational picture.

(b) Ability of C3 to be networked and assist in the command and control of Alliance units making integrated operations of alliance forces more efficient and resilient.

(c) Ability of Alliance leaders to have awareness and influence beyond alliance forces and operations and have the ability to monitor and interface with non-military organizations such as local governments, non-governmental organizations, and business enterprises.

(d) Ability of leaders to understand non-military environments including financial, cultural, ethnic, societal, and religious networks.

(5) Communications - Ability to gain and maintain dominance of the frequency spectrum and access to beyond line-of-sight communications.

(a) Ability to possess and use robust communications networks and systems including existing civilian infrastructure.

(b) Ability of NATO forces to be operationally proficient in communications degraded or contested-denied environments.

(c) Ability of the Alliance to make use of the most advanced communications technology.

(d) Ability of the Alliance to communicate with long-range communications to facilitate real time reach-back and enable the chain of command to execute C3 over vast distances.

(e) Ability of NATO forces to posses sufficient bandwidth to allow mobile, secure, rapid and timely information flow between the tactical, operational, and strategic levels of command.

e. Prepare.

(1) Cooperation With Security Partners - Ability to operate with partner nations and other international organizations.

(a) Ability to be interoperable with partner nations.

(b) Ability to develop standardized policies, doctrine, tactics, techniques, procedures, collaborative planning, training, exercises, education, and standardization.

(c) Ability to maintain and/or establish formal NATO Partnerships.

(d) Ability to engage ad hoc through regular dialogue.

(2) Comprehensive Approach to Military Operations - Ability to synchronize efforts with partners, international organizations, partner organization, non-governmental organizations, commercial/non-commercial organizations, state agencies, armed and security forces.

(a) Ability to exploit full range of potential relationships with a wide range of relevant actors to include academia, industry, international aid, law enforcement, others.

(b) Ability to coordinate military actions with diplomatic, economic, social, legal, and information initiatives.

(c) Ability of NATO to initiate and influence debate on international law, policies, and ethics.

(d) Ability to operate in an informationally ambiguous environment/ contested information.

(e) Ability to operate in an EM degraded/denied environment.

(f) Ability to operate in an cyber degraded/denied environment.

(3) Scalable and Modular Units and Organisations - Ability to prepare for a wide range of contingencies and offer maximum agility, flexibility, and efficiency at the appropriate level of readiness (at battalion+ level).

(a) Ability to adjust forces in scale and capability.

(b) Ability to have modular, flexible forces that can be tailored to specific missions and at different echelons.

(c) Forces capable of deployment and sustainment across a wide range of environments and capable of operating at small scale and increasing operational tempo to maintain the initiative, as required.

(4) Creative Use of Human Resources -Ability to increasingly build trust with stakeholders, share information, and be culturally aware.

(a) Ability to understand and exploit cultural differences including language, religion, history, habits, etc.

(b) Ability to build up and rapidly integrate additional forces (e.g., national reservists).

(c) Ability to make use of National expertise such as government, medicine, law enforcement, education, and other specializations.

(d) Ability to train personnel to perform new and emerging tasks without reducing the individual expertise and proficiency within a primary occupational skill or set of critical abilities.

(5) Leader Development - Ability to develop leaders with greater political, technological, cultural, informational, sociological awareness in order to better identify and mitigate risk while capitalising on opportunities.

(a) Ability to foster a culture of technological awareness where personnel understand technology and impact on operations and other activities.

(6) Training and Exercises- Ability to conduct exercises that demonstrate capability and resolve across all domains (including space).

(a) Ability to facilitate training and simulation in all areas, experiment and test new systems, reduce cost and environmental impact, and increase realism.

(b) Ability to conduct training and exercises which increasingly integrate emerging technologies into virtual environments into all military areas as required (e.g., AI, human augmentation, autonomous systems).

(c) Ability to train Allied and Partner forces for the most probable and most demanding operations and to be prepared for a wide array of factors of instability situations.

(d) Ability to train forces to perform military activities across all of the core tasks and main capability areas.

(e) Ability to minimize the unintended consequences of operations on the local population and infrastructure through specific training.

(f) Ability to train forces to preserve their basic military skills and operate independently if necessary in order to overcome the loss of critical systems, such as global positioning systems, communications, and command and control systems.

(g) Ability to perform a mix of realistic live and simulated training in all areas, including hybrid, cyber, Integrated Air and Missile Defence, Anti-Access/Area Denial in all domains, nuclear, radiological, biological, and chemical, dense urban areas, AI and autonomous systems environment, lawfare.

(h) Ability to strengthen education training, and exercises by integrating lessons learned and best practices.

(7) Best Practices - Ability to quickly incorporate innovative best practices into all Alliance military activities.

(a) Ability to use and improve a multi-domain network connecting tactical through strategic levels, enable collaborative planning, create synchronized effects, and facilitate the timely exchange of tactics, techniques, and procedures, and best practices.

(b) Ability to align concepts, doctrine, and tactics, techniques, and procedures.

(c) Ability to conduct near real time analysis of NATO operations and lessons learned.

(d) Ability to conduct experiments that include new challenges and opportunities (such as AI, human augmentation, autonomous systems, cyber, hybrid, and space warfare).

(e) Ability to train leaders in new technologies and capabilities including autonomous and robotic machines, big data, cyber and space systems.

(f) Ability of leaders to integrate technology into operations and contribute to the development of new concepts, doctrine and legal frameworks.

(g) Ability of leaders to improve cultural understanding and knowledge of local languages and train to develop specific regional expertise as necessary.

(h) Ability of military units to maintain adequate English proficiency to ensure an ability to communicate clearly across the joint force.

(8) Human Factors - Ability to monitor and explore innovations in human physical and mental enhancement.

(a) Ability to identify human augmentation applications and risks, including overreliance on technology.

(b) Ability to explore impacts of human augmentation on the organization and individuals.

(9) Training for Urban Operations- Ability to train for operations in urban terrain and densely populated areas.

(a) Ability of NATO forces to train to understand force restraint, apply proportional response and be proficient with non-lethal means.

(b) Ability of forces to train for close human interaction, and interface with large distressed populations.

(c) Ability to train for crowd control and understand crowd mobilisation and be able to cope with large movements and concentrations of people including Internally Displaced Persons/ refugees and armed civilians.

(d) Ability to train for humanitarian assistance and effective quarantine measures in case of a pandemic.

(e) Ability to train to adopt constabulary and forensics, for use in supporting local police when requested

(10) Train for Integrated Cyber Operations- Ability to fully integrate cyber operations with all other alliance operations.

(a) Ability to develop and share a cyber common operational picture (including cyber intelligence) and cyber best practices, and develop new operational cyber organizations as required.

(b) Ability to educate personnel in cyber-security, and modern communications threats and opportunities.

(c) Ability to perform cyber operations as a partner capacity building task.

(d) Ability to train and certify cyber experts to gain an enhanced understanding of emerging technologies and new areas of cyberspace.

(e) Ability to identify and request adaptations of cyber policy, including Standard Operating Procedures when required.

(11) Rules of Engagement/Military Authorities - Ability to provide military leaders with sufficient guidance and rules of engagement to prepare them to act within their designated authorities in environments where adversaries employ lawfare against NATO.

(a) Ability to understand and deconflict national rules of engagement.

(b) Ability to adapt rules of engagements/Military authorities in new domains and to include emerging technologies.

(c) Ability to clearly define authorities and jurisdictions to enable leaders to make sound decisions rapidly.

(12) Military Acquisitions and Procurement - Ability to coordinate closely with Member Nations to ensure assigned forces are properly equipped to meet operational requirements and have the necessary capabilities to perform all required tasks. Provide best military advise to political leadership concerning procurement efforts utilizing the NATO Defence Planning Process.

f. Protect.

Request to add an introductory paragraph to explain the impact of perception (360 degrees) and the multi-dimensional approach, the connection between prevent and protect, and the requirement for resilience in protection.

(1) Mission.

(a) Ability of NATO to protect the Centre of Gravity, the cohesion of the Alliance, and the political will.

(b) Ability of NATO forces to protect and sustain the cooperation with partners.

(c) Ability of NATO forces to create a permissive environment for their operations, to counter A2AD systems and to enter, maintain and operate in an area of operations despite anti-access and areal denial methods.

(d) Ability to retain assured access to the global commons (incl. space) and continued use of its lines of communication.

(e) Ability to assist local authorities (when crisis overwhelm civilian response) in protecting civil infrastructure and key services including: governance, health, emergency, security/law enforcement, finance, transportation, power, communications, utilities, agriculture and food.

(2) Personnel.

(a) Ability to establish superior force protection measures, physical security, and access control in high-threat environments to minimise risk to Alliance Forces.

(b) Ability to avoid, minimize, and mitigate negative effects of operations on civilians, and protect civilians from conflict-related violence from hostile actors.

(3) Materiel - Ability to protect military equipment and capabilities (incl. strategic reserves)

(4) Infrastructure and Facilities.

(a) Ability to protect critical military and civilian infrastructure, logistic facilities, vital networks, natural resources, and essential lines of communication.

(b) Ability to assist local authorities in the preservation of civilian property that is culturally and historically important (e.g. national monuments and icons).

(5) Information and Cyber.

(a) Ability to validate information and to protect against manipulation to ensure information is available, accurate, reliable, and from trusted sources.

(b) Ability to protect the EM environment and to detect, investigate, and defend against all forms of EM attack.

(c) Ability to protect the cyber environment and to to detect, investigate, and defend against all forms of external and internal cyber-attack.

(6) Disasters and Hazards - Ability to protect forces from extreme environmental conditions, health and safety issues, and the ability to minimize the environmental impact due to force operations or collateral damage.

(7) WMD and Weapons of Mass Effect - Ability of the Alliance to counter the threat and protect the forces from WMD/E use and in particular the reemerging threat of nuclear weapons.

(8) Outlook for Potential Threats - Ability to identify, monitor and understand, and protect against emerging threats coming from new technology or from new, creative/innovative tactics, techniques, procedures, capabilities, or doctrine. (Examples are sub-surface and subterranean threats, swarm techniques, space based weapons, directed energy, autonomous systems and sensors, quantum computing, unmanned systems, electromagnetically launched projectiles, renewable energy, artificial intelligence, 3D printing, additive manufacturing, biotechnology and nanotechnology.)

g. Sustain.

(1) Innovative Supply of Material and Services and Minimized Logistic Footprint - Ability to minimise logistics footprints, ensure uninterrupted logistic support, and where necessary create backup sustainment systems.

(a) Ability to simplify and improve sustainment and logistics, leveraging technologies and autonomous systems and where necessary balance smaller/shorter logistics support against operational risk.

(b) Ability to establish, maintain and use dispersed logistics hubs when required.

(c) Ability to contract local sustainment or use host nation support when required.

(d) Ability to make use of appropriate logistics techniques such as in-theatre production of consumables, and the reduction, exploitation, and conversion of waste to increase self sustainment and reduce environmental impact.

(e) Ability to reduce unnecessary redundancy and streamline sustainment where possible (e.g. big data/AI/in theater manufacturing).

(f) Ability to leverage energy efficiency and new technologies to minimize logistic footprint while enhancing military capabilities.

(2) In Theatre Movement and Transportation - Ability of forces to have assured access to sufficient ground, air, space, and sea transportation assets to support sustainment, deployment, and redeployment of forces across the whole NATO Area of Operation.

(a) Ability for NATO to coordinate and manage movement and transport.

(3) Standardization - Ability to develop and use interchangeable modular structures, easily repairable standardized equipment and interoperable spare parts across the Alliance, partners, and commercial sector

(a) Ability to understand and track the different standards for the force

(b) Ability to maintain standardization across the Alliance and with the commercial sector during member nation acquisition processes.

(c) Ability to train to overcome a lack of interoperability in those areas where interoperability cannot be achieved.

(4) Diversification and Impact of Logistics - Ability of Allied forces to identify and use a network of military and non-military partners to help sustain multi-domain operations with scalable logistics (to include sustainment in a post-CBRN incident).

(a) Ability of NATO forces to use local/regional commercial venders and third-party logisticians to enable logistics in austere or urban environments.

(b) Ability of NATO forces to retain their ability to self-reliant on their own Member Nations' logistics.

(5) Future Force Sustainment - Ability of forces to operate with smaller, modular, multi-capable, and agile units that will often operate in a distributed or logistically autonomous manner, but that are networked together.

(a) Ability to develop and use more modular and flexible logistics structures which common stock systems and procedures.

(b) Ability of leaders to conduct operations from forward areas with limited logistic support, and a reduced reliance on local infrastructure.

(c) Ability to manage prioritization of logistic resources, including contracting between NATO and national support.

(6) Sea Basing and Resupply from the Sea - Ability to use sea-based logistics during operations provided that sea based assets are protected from threats.

(7) Military Engineering - Ability to possess adequate military engineering to enable Allied operations.

(a) Ability to accomplish a wide range of military engineering tasks to gain and maintain freedom of movement and support force protection within the theatre.

(b) Ability of NATO force military engineering to support critical infrastructure and civilian and military life support (including Humanitarian Assistance/Disaster Relief).

(c) Ability to maintain extensive interoperability and use civilian contracting to compliment organic military engineering capability.

(8) Networked Sustainable Medical Support - Ability of NATO to rapidly deploy medical personnel, equipment and facilities.

(a) Ability of medical personnel, equipment, and facilities to deploy to austere environments under degraded conditions.

(b) Ability to exploit new technologies that improve medical care while reducing logistical footprint. New technologies may include (but are not limited to) robotics, information systems, cameras or other devices which may make delivering healthcare viable even when health care providers are not physically present.

(c) Ability of NATO to manage and coordinate closely with local civilian and military health care providers, local governments, or international organizations, and ensure best medical practices which may include local contractor.

(d) Medical Support in Geographically Dispersed Operations and Enhanced Individual Resilience - Ability of forces to operate while being geographically dispersed, potentially stressing existing medical support capabilities.

(e) Ability to use new methods of monitoring and enhancing individual health and resilience to ease the stress on medical support, and could include networked health sensors and self-healing (including physical and mental well-being).

(f) Ability to provide front-line care even where medical specialists are unavailable or impractical through the use of first responders and/or telemedicine.

(g) Ability to use semi-autonomous assets for patient transportation and medical supply.

(9) Epidemiological issues (pandemics).

(a) Ability for early detection of infectious diseases (via health surveillance systems).

(b) Ability to share health surveillance information with Host Nation, IOs, and NGOs (medical intelligence).

(c) Ability for NATO to operate in an area affected by an epidemic situation.

(d) Ability to deploy and assist local medical healthcare system.

(e) Ability to sustain Force Health Protection.

(f) Ability to take and provide rapid countermeasures (PPE, decontamination, medication, vaccination, and quarantine, water and food security, hygienic measures, etc).

4. Way-ahead. The workshop achieved the overall objective of getting the raw material needed for Chapter 3 of the FFAO. Moving forward, the FFAO team will incorporate recommended changes into the draft Chapter 3 of the document. In October 2017, this document will be submitted for full staffing and review.

5. Office of Primary Responsibility (OPR). The OPR for this document is Strategic Analysis Branch, Strategic Plans and Policy Division, Headquarters, Supreme Allied Commander – Transformation. Points of contact are Colonel Tibor Szabo, tibor.szabo@act.nato.int and LTC Aaron Bazin, aaron.bazin@act.nato.int. Conference slides and supporting documentation is available at: http://www.act.nato.int/futures-work