



# NATO C2COE

## Quick Reference List 2020



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## Introduction

In the annual cycle is the annual meeting of the representatives of the participating nations, the so-called Steering Board Meeting, and during that time the determination of the work content of the coming year, a cornerstone if not the milestone in the calendar of NATO C2COE.

The compendium now available to you is the result of the multinational coordination process and lines out the work contents of the NATO C2COE for the year 2020. A very broad spectrum is required, ranging from theoretical groundwork, practical input into the evaluation of relevant certification exercises of NATO headquarters, to the development of a further, previously unperformed field of activity, education and training.

The important work to support NATO HQs at operational and strategic level is also in demand for 2020 and the competence is recognized and confirmed.

In very challenging times, especially in the area of personnel growth in the NATO Command Structure, and the resulting consequences of the personnel situation of NATO C2COE, prioritizing the requested support must be reconciled with our own projects which, in our view, are evident for Nato's advancement. Have we covered this broad spectrum?

Take a look at this overview of the topics we are dealing with in the focus 2020 and form your own opinion.

And if you would like to participate, or if you would like to influence the future NATO with your contribution, do not hesitate and let us talk about participation as a partner, and thus as a participant in the NATO C2COE Steering Board Meeting.

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# CONCEPTUAL FRAMEWORK



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## Generating a Conceptual Framework on Command and Control

Command and Control (C2) is the core business of NATO C2COE and the very reason for its existence. The many aspects of C2 form the essence of the Centre's daily work. However, the actual concept behind the composite term "Command and Control" remains somehow confusing and vague, especially among the international community. Today, we are therefore experiencing a variety of theories/approaches.

A means to structure C2 approaches is to build a model. The Canadian researchers Pigeau and McCann have found that if an infinite number of different ways of spanning spaces exists, the use of a structure immediately reduces the space for describing the problem to a smaller, more manageable size [1]. The American C2 theory pioneers Alberts and Hayes have found that our current state of understanding can be presented in conceptual models [2]. Accordingly, they describe a conceptual model as a structured way to represent a theory that consists of a set of facts or assumptions (variables) and the relationships among them.





As stated, despite past efforts the concept of C2 needs clarification. Building a conceptual model in order to structure our current knowledge, thereby reducing the space around C2 to a smaller, more manageable size, allows the NATO C2COE to better deal with the concept. Consequently, it will provide a greater focus in our support to NATO.



An in-depth study into C2, called the C2 Conceptual Framework, started in 2015. A draft of the study report, available since summer 2016, contains a model which can be used in C2 assessments and identifies prevailing and the most essential C2 components. This version proved to be useful when discussing the work on the Allied Command Transformation (ACT) C2 Capstone Concept in 2016 and the British Development, Concepts and Doctrine Centre's (DCDC) work on the Joint Concept Note 2/17 "Future of Command and Control", as well as when introducing new Centre members. However, it was agreed that this draft required a strong editorial hand to improve readability and access. Bringing the required specialists together to finalize the project appeared to be a challenge. This year will finally see the publication of a first edition of the food for thought study.

For more information on the NATO C2COE activities related to this project, please contact our project officers:

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[1] Pigeau, R. & McCann, C. 2002. Re-conceptualizing Command and Control. Canadian Military Journal: Spring 2002; page 54.

[2] Alberts, D., S. & Hayes, R., E. 2006. Understanding command and control. Washington, DC: CCRP Publication Series; pages 16. and 17.





## MAPPING OF C2



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The only commonly agreed upon NATO definition on **Command and Control** is currently as follows:

*Command and Control: the authority, responsibilities and activities of military commanders in the direction and co-ordination of military forces and in the implementation of orders related to the execution of operations.*

This definition, which dates from 30 June 2017 and can be found in the NATO CIS Glossary AAP-31(A), is not disseminated in doctrine. As doctrine functions as a tool to standardize different aspects, including terminology, and enhances interoperability and mutual understanding through the creation of a common language, this missing definition is remarkable. Some authors have also found that the official explanations of the separate terms Command and Control are circular and redundant, as may become clear from the following example:





#### Command

- The **authority** vested in an individual of the armed forces for the direction, coordination, and control of military forces. 29 May 2002 (AAP-06 2013: 2-C-8)

#### Control

- The **authority** exercised by a commander over part of the activities of subordinate organizations, or other organizations not normally under his command, that encompasses the responsibility for implementing orders or directives. 30 Jan 2012
- (AAP-06 2013: 2-C-13)

*"The terms command and control are closely related and regularly used together; however, they are not synonymous" AJP-01(D) superseded by AJP-01(E)*

The goal of the "Mapping of C2" project is to identify and analyze the use of these and other "C2"- related terms in NATO publications in order to contribute as a SME to the review or rewrite process of these publications, thus fulfilling our obligation as a COE to be active in the "Doctrine and Policies" pillar. The scope of this project includes the promulgated NATO level 1 publications and ATP-3.2.2 (a specific C2-related level 2 publication).

After this "where", the project will then examine "how" these existing NATO documents define and describe Command, Control and their combined use as C2. It will compare and discuss whether all C2 components as defined in our own draft "NATO C2COE C2 Conceptual Framework" are adequately and clearly covered.

The deliverable is a complete digital (Excel) list of C2 references per publication (including analysis and recommendations for their use) on Sharepoint, based on the Request For Feedback questionnaire. These recommendations will be forwarded once Request For Feedback questionnaires are received regarding a rewrite/revision of a specific doctrine related to the Allied Joint Doctrine Campaign Plan. The aim is to propose a common C2-language for consistent application in NATO doctrines, which will support NATO interoperability.

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# RELATIONSHIPS AND AUTHORITIES



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## NATO Command and Control Relationships and Authorities

NATO C2 relationships and authorities as described in NATO policies, doctrines, directives, and concepts are designed to be flexible, but should be clear to all involved. Experience gained from both NATO-led operations and NATO exercises suggests that such clarity is lacking. Additionally, some inconsistencies seem apparent among various NATO publications.

For that reason, there is a need for a study to review all NATO publications that refer to NATO C2 relationships and authorities in order to identify areas that could give rise to misinterpretation by NATO commanders and staffs, and subsequently to propose recommendations to address the identified issues. Allied Command Transformation forwarded the formal request in August 2018.



The study is led by the NATO C2COE. Finalization is scheduled before October 2020. The foreseen outcome is a clear, mutual understanding of C2 relationships and authorities within NATO. The analysis will support the NATO commanders and their planners at all levels in their tasks.

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## C2 JIMP AND FLOWS

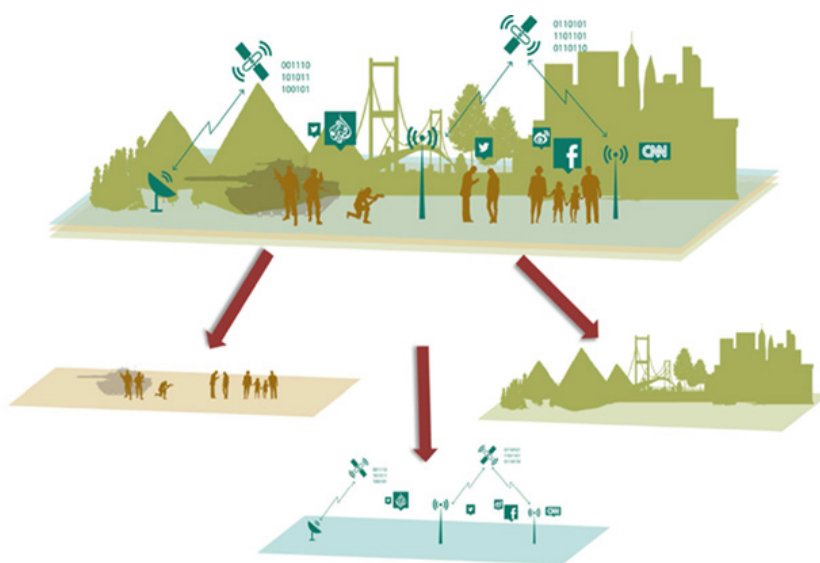


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### NLD study on C2-services for jimp and related flows

The NLD MOD has requested the Netherlands Organisation for Applied Scientific Research (TNO) to start a national study focusing on C2 services for operations in a Joint, Interagency, Multinational and Public (JIMP) environment and the related “flows”. The term “flows” refers to the dynamic interaction between (activities of) actors and factors in such an environment.

The study will centre on the future C2 support systems for situational awareness and decision making. This effort will be supported by all armed forces services by the participation of experts in meetings as well as representation in the Steering Board. This wide participation ensures that the research/development is in line with future operations and meets demands. Also important for the study are the C2 developments within NATO, as the Netherlands has to stay aligned with the Alliance.



This study and its outcome have a close relationship with the work and tasking of the NATO C2COE. It provides an opportunity to work closely together with TNO, our special partner, and the armed forces services, which together provide the staff for the NATO C2COE.

The Centre will provide a NLD C2 specialist to complement the TNO studies that describe intended C2 developments in selected countries and within NATO.

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# FMN



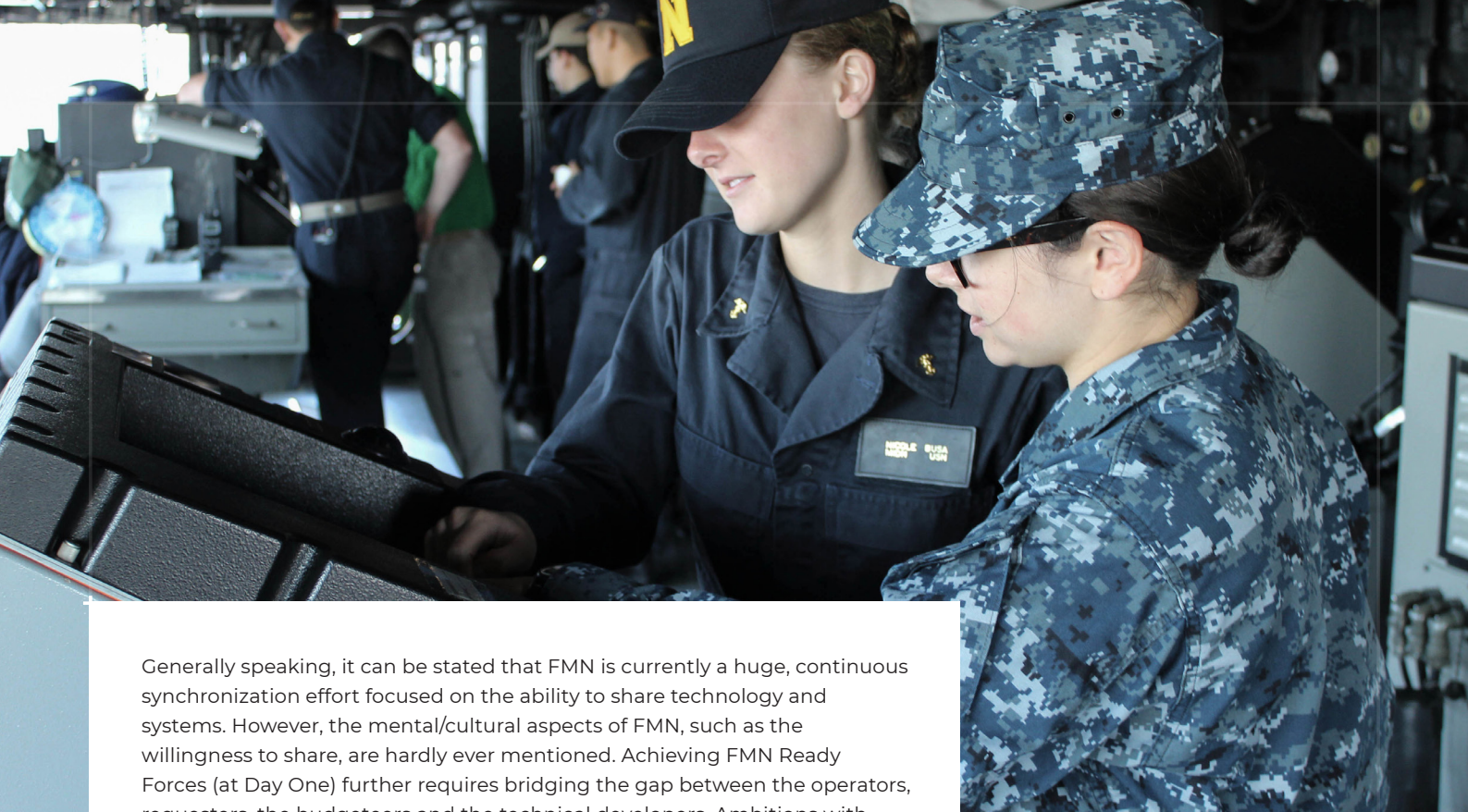
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## Federated Mission Networking (FMN)

In November 2012, the Military Committee provided overarching guidance for establishing a Federated Mission Network (FMN) capability. This will enable effective information sharing among NATO, NATO nations, and/or non-NATO entities; the so-called Affiliates. FMN will connect forces participating in an operation to a federated mission environment at any time, quickly and at an optimised level of interoperability. The ultimate purpose of FMN is to support command and control and decision-making in operations. This FMN concept is a key contribution to the Connected Forces Initiative (CFI), helping NATO and partner forces to better communicate, train and operate together.

The NATO C2COE, that has information management and human aspects as two of its focus areas, is especially interested in the Operational Coordination Working Group (OCWG), as it represents the operators of FMN. The OCWG is responsible for collecting, expressing and managing operational requirements.





Generally speaking, it can be stated that FMN is currently a huge, continuous synchronization effort focused on the ability to share technology and systems. However, the mental/cultural aspects of FMN, such as the willingness to share, are hardly ever mentioned. Achieving FMN Ready Forces (at Day One) further requires bridging the gap between the operators, requesters, the budgeteers and the technical developers. Ambitions with regard to the pace of progress have to be realistic and have to pay attention to organisational processes such as rigid procurement cycles. No Affiliate should be left behind. But most important is the involvement of the war-fighter, who longs for working solutions but is often weighed down by his workload and often totally unaware of the structured efforts to better support him. He might even be unaware of the current improvements developed for him by successive FMN implementations.

The NATO C2COE will continue its enduring contribution to the OCWG in 2020, since its participation provides valuable insights and influences the development of FMN-facilitated C2 concepts. In 2020, there will be two formal meetings, in between which the SMEs will comment on the draft Spiral Procedural Instructions as required. Participation in both 2020 TIDE Sprint (Stockholm and Norfolk) is also linked to the NATO C2COE FMN commitment.

For more information on the NATO C2COE activities related to this topic, please read our articles in previous Annual Overviews or contact our project officers

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# MULTI-DOMAIN



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## Multi-Domain Operations

During the final months of 2019, the OA branch will continue to develop thoughts, theories and proposals for definitions in the area of Multi-Domain Operations and C2. Where NATO currently recognizes five operational domains (Air, Land, Maritime, Space and Cyber), the NATO C2COE feels that this approach is too limited to prepare the Alliance forces for future conflict, regardless of scale and intensity. The NATO C2COE supports the ACT study “Does NATO need Multi-Domain C2?” and provides input and feedback for SHAPE’s Joint C2 CONOPS and similar developments within other agencies. The findings on Multi-Domain Operations and C2 will also play an important role in the NATO C2COE’s 2020 edition of its C2 Seminar, entitled “Multi-Domain Operations – keys to master complexity”.

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## DEPARTMENT HEAD

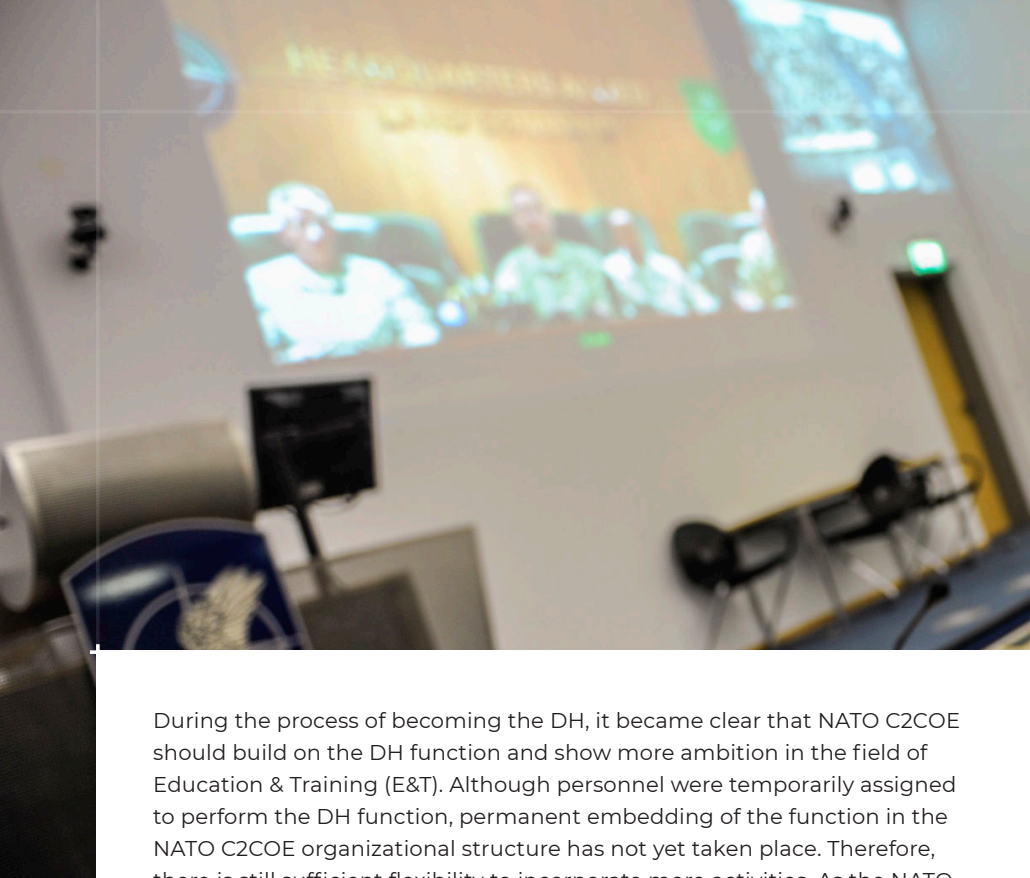


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### Department Head Operations Planning, Operations Assessment and Alternative Analysis (OPOAAA)

On 5 September 2018, the NATO C2COE Steering Board accepted the task of becoming a Department Head (DH) for Operations Planning, Operations Assessment and Alternative Analysis (OPOAAA). In order to execute the task properly, preparation was required. Joint Force Development (JFD) offered to take on the responsibility of acting as DH for one year with NATO C2COE in a supporting role. This created the opportunity for the NATO C2COE to gradually assume the DH responsibility while executing the necessary preparatory actions. On 1 September 2019, the NATO C2COE took over the basic DH function for the discipline. As of the aforementioned date, the NATO C2COE is able to perform the tasks as described in the Bi-SC 75-002, with the exception of lending supporting to individual NATO-led trainings with SMEs and supporting the NATO Officer Conducting Exercise (OCE) with regard to the planning and conduct of collective training sessions and exercises.





During the process of becoming the DH, it became clear that NATO C2COE should build on the DH function and show more ambition in the field of Education & Training (E&T). Although personnel were temporarily assigned to perform the DH function, permanent embedding of the function in the NATO C2COE organizational structure has not yet taken place. Therefore, there is still sufficient flexibility to incorporate more activities. As the NATO C2COE is currently active in three of the four COE pillars, it makes sense to add the fourth pillar 'Education and Training' to the activities. This will also add to four of the six phases of warfare development by ACT. Furthermore, it will enhance the NATO C2COE's visibility. It was therefore decided to build a new E&T branch within the NATO C2COE, focusing on three primary functions. The first function is the DH function, with all the tasks attached to this function. Among them will be the development and delivery of in-house produced C2-related training solutions (lectures, workshops, courses, ADL, etc.). The second function will focus on the Internal improvement of the NATO C2COE (knowledge sharing, newcomers in-briefs, etc.). The third function will concentrate on educational management. This function includes the DH function, knowledge management, coordination with other education/training facilities, etc.

In order to achieve a fully functional E&T branch within the NATO C2COE a 2-year process is anticipated. In 2020 the NATO C2COE will form an internal E&T branch using temporary personnel. This will allow a flexible approach (learning by doing). Transition into a formal structure is foreseen for 2021. It will require Steering Board approval (formal reorganizational changes need to be approved) and certainty with regard to the willingness of nations to fill the foreseen positions.

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# HUMAN CAPITAL GAPS



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## Human Capital Gaps Analysis

In 2019, HQ SACT Human Capital Enhancement Branch started a Human Capital Gaps Analysis. The objective is the development of a comprehensive human capital programme and the generation of a stronger human capital focus as an integrated force booster through innovative attitudes, behavioural changes, training, education and technology application. The aim is to find out where the deficits or gaps lie in relation to the individual sub-themes.

In 2020, the NATO C2COE will participate in the Analysis by participation of two staff officers who have already gained experience in human factors through their work on the NATO C2COE study "The Future of the Command Post Part II".

For more information on the NATO C2COE activities related to the Human Capital Gaps Analysis, please contact our project officer:

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# LESSONS LEARNED



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## Lessons Learned Process and Analysis

As every year, in 2020 the NATO C2COE is ready to analyze, on request, topics within the specific area of C2 in order to produce an analysis report, either to support ACT and JALLC or to lead a study. In addition, the NATO C2COE participates in the annual workshops of the NATO Lessons Learned Community and contributes to the further development of NATO's LL process.

For more information on the NATO C2COE activities related to the activities related to Lessons Learned and Analysis, please contact our project officer:

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# MULTI-DOMAIN URBAN OPS



## Multi-Domain Urban Operations

The majority of the world's population now live in urban areas, and the trend towards urbanisation is continuing to rise. History has taught us that conflict and large-scale disasters often occur where people live. Consequently, if the majority of people are going to be living in urban environments such as megacities and conurbations, an increasing number of future military operations will take place in these environments. NATO therefore needs to prepare for such operations.

Following the publication of the Capstone Concept – Joint Military Operations in the Urban Environment, published in 2018 – and the Campaign Steering Board approval to develop an operating concept for 'Multi-Domain Urban Operations', the SACT team has begun the concept development research phase to which NATO C2COE subject matter experts will contribute.



The aim is to develop an Initial Concept and a Concept Development Plan which will address:

- operating in a large urban or megacity environment;
- military operations against peer, near peer and hybrid threats;
- identify gaps in operational capability;
- the complexity of the multi-dimensional and cross-domain urban environment;
- urban-social resilience;
- sustainment of urban ops

For more information on the NATO C2COE activities related to the Operating Concept for Multi-Domain Urban Operations project, , please contact:

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# NATO STO SAS-143



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## NATO STO SAS-143 Agile Multi Domain C2

Current Command & Control (C2) practice is being changed by both the need to conduct Multiple Domain Operations (MDO) and an increasing reliance on robotics and Artificial Intelligence (AI) that are a challenge for C2. MDO prompts the need to harmonize activities in the physical (e.g. land), virtual (e.g. cyber) and social domains (e.g. economic). Without sufficient harmonization, MDO is likely to fail. Likewise, without incorporating non-human partners, NATO will be outmanoeuvred by its adversaries. Our C2 arrangements need to include non-human partners. To succeed, militaries need to develop multi-domain approaches to C2 and also adapt individual domain C2. SAS-143 is developing the C2 concepts and tools necessary to achieve harmonization across operations in multiple domains with a variety of human and non-human partners. These concepts will be tested for efficacy in simulations, war games and exercises.





Since 2018 NATO has participated with two C2 subject matter experts (SMEs) in the work of the SAS-143. The goal for 2020 is to complete the “Agile Multi-Domain C2/Harmonization” study.

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For more information on the NATO C2COE activities related to the Human Capital Gaps Analysis, please contact our project officer:  
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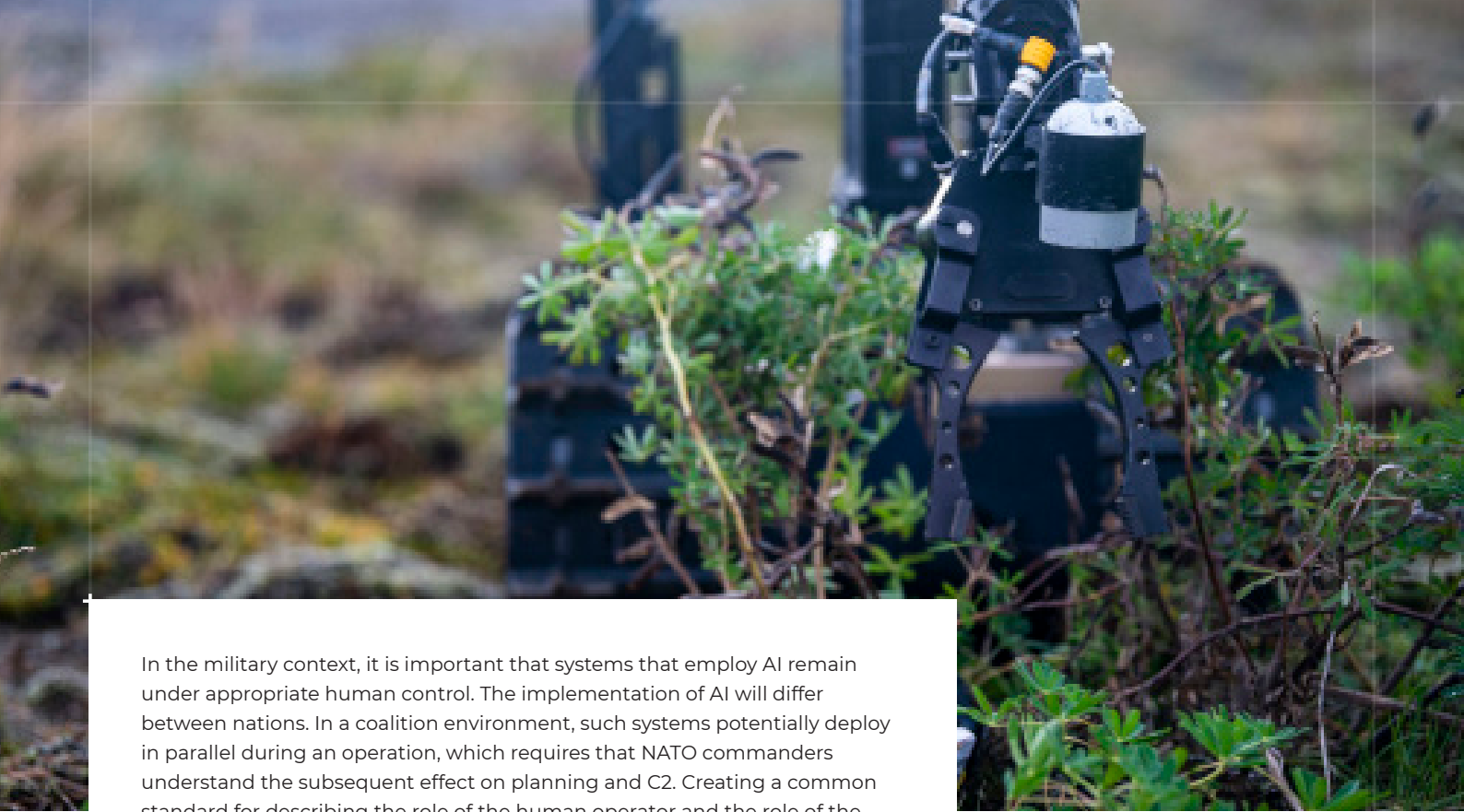
# NATO STO IST-157



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## Human in the loop Considerations for Artificial Intelligence C2

Work conducted by the Multinational Capability Development Campaign has concluded that "The prevalence of systems employing... [Artificial Intelligence (AI)]... is growing in the military sphere; such systems will likely become a permanent feature of military operations. The implications for military operations and capabilities are broad and significant. The role of AI in military systems is one of the most important considerations for defense policy makers in the near future. An important consideration for the design and operation of systems with autonomous capability is the level of human control in the system."



In the military context, it is important that systems that employ AI remain under appropriate human control. The implementation of AI will differ between nations. In a coalition environment, such systems potentially deploy in parallel during an operation, which requires that NATO commanders understand the subsequent effect on planning and C2. Creating a common standard for describing the role of the human operator and the role of the machine in systems that use AI will help commanders incorporate such systems in their planning processes.

Since 2017, the NATO C2COE has participated with two C2 subject matter experts (SME) in the work of the IST-157. The goal for 2020 is to explore how the “Augmented Near real-Time Instrument for Critical Information Processing and Estimate” (ANTICIPE) AI-technology prototype affects C2 decision-making in complex situations. The test bed will be NATO’s STEADFAST JUPITER-JAGUAR Exercise. Outputs from the experimentation will inform broader IST-157 research.

For more information on the NATO C2COE activities related to IST-157, please contact our project officer:

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## SFA AND FFAO



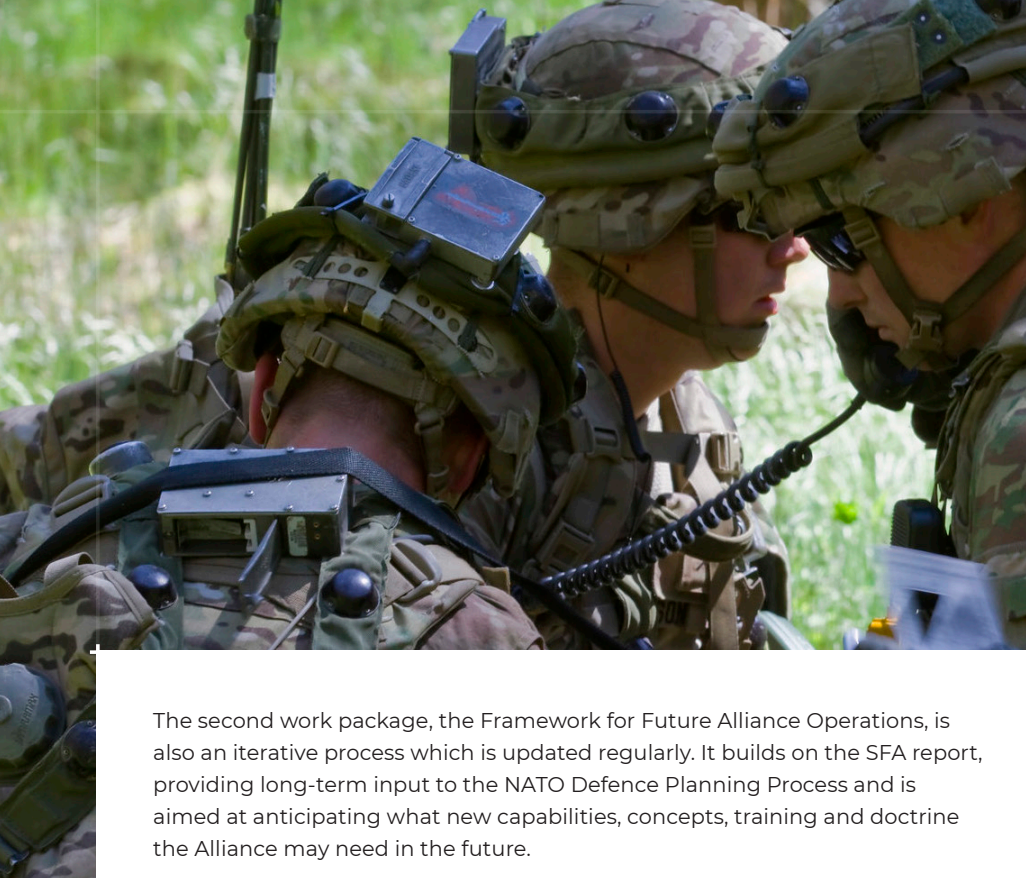
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### Strategic Foresight Analysis (SFA) and Framework for Future Alliance Operations (FFAO)

The NATO C2COE has for several years been actively involved in the efforts of Allied Command Transformation (ACT) to predict the future and envision the capability needs required in future NATO operations. This process has been divided into two closely related, but separately handled, work packages.

The first work package, the Strategic Foresight Analysis, is an iterative process which is updated regularly. It identifies future themes, trends and security implications for the Alliance. The SFA 2013 report was released as the first result of this process, and the SFA 2017 report was published at the end of 2017. A new revision cycle was launched in 2018. This cycle will continue in 2020 with the support of NATO subject matter experts.





The second work package, the Framework for Future Alliance Operations, is also an iterative process which is updated regularly. It builds on the SFA report, providing long-term input to the NATO Defence Planning Process and is aimed at anticipating what new capabilities, concepts, training and doctrine the Alliance may need in the future.

The NATO C2COE will continue to support ACT with two staff officers in the important process of creating and updating the SFA and FFAO reports.



For more information on the NATO C2COE activities related to the SFA and FFAO project, please contact our project officer:

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# SVK ARMED FORCES TRAINING



**NATO**  
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## Support for SVK Armed Forces Training

In 2020, the NATO Command and Control Centre of Excellence (C2COE) will provide subject matter experts to contribute to and support training and education events in Slovakia in response to a request made by the Slovak armed forces.

The Peace Support Operations Training Unit/Training Battalion in Martin, Slovakia, will organise the training of Slovak armed forces personnel selected for positions in NATO/EU organisations.

The Armed Forces Academy of Milan Rastislav Štefánik in Liptovský Mikuláš, Slovakia, will organise senior command and staff officer courses. The career educational courses are designed for officers of the Slovak armed forces by the Lifelong Education Centre at the Armed Forces Academy. Graduates earn the qualifications necessary to achieve the ranks of lieutenant colonel and colonel.



NATO C2COE will support both training events organised by the Peace Support Operation Training Unit and the Armed Forces Academy of Milan Rastislav Štefánik with two C2 subject matter experts. The NATO C2COE SMEs will provide training focused on current C2 topics, the NATO command structure, information management and information knowledge management, and C2 processes at the operational level.

For more information on the NATO C2COE activities related to the SFA and FFAO project, please contact our project officer:  
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# STEADFAST JUPITER-JAGUAR 2020



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## NATO NRF Exercise STEADFAST JUPITER-JAGUAR 2020 (STJU-JA 20)

STJU-JA 20 is a Command Post Exercise (CPX) / Computer-Assisted Exercise (CAX) to train the NRF (NATO Response Force) package and evaluate the NRF21 Component Command's planning and conduct of a non-Article 5 Crisis Response Operation (NA5CRO). It will be a three level exercise involving strategic, operational and tactical levels, on the scale of a Small Joint Operations (SJO).

For years, NATO C2COE has supported the certification process for NRF headquarters by assigning C2 subject matter experts (SME C2) to the SHAPE J7 evaluation teams and the training teams of the NATO Joint Warfare Center (JWC). Also in the phases IIB (Planning) and IIIB (Execution) of STJU-JA 20, a NATO C2COE C2 SME will again reinforce the SHAPE J7 and NATO JWC teams as an evaluator or trainer/observer.

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# TRIDENT JUPITER 19 - 2



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## NATO NRF Exercise TRIDENT JUPITER 19 - 2 (TRJU 19-2)

TRJU19 is an Article 5 high intensity operation exercise to train the NRF (NATO Response Force) package and evaluate the NRF20 Component Command's planning and conduct of a forcible entry operation, involving appropriate regional NATO C2 and non-NATO entities (NNE).

After the exercise phases IIB (planning) and IIIB (execution) of TRJU 19-1 (NRF certification of STRIKEFOR NATO) in 2019, the exercise phase IIIB for TRJU 19-2 (NRF certification for Joint Force Command Brunssum) will take place in 2020. For years, NATO C2COE has been supporting the certification process of NRF headquarters by seconding C2 subject matter experts to the SHAPE J7 evaluation team.

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