

NATO URBANIZATION PROJECT 2035



MATRIX WARGAME



NATO Joint Military Operations in an Urban Environment //A Capstone Concept

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Introduction

This is the third article provided by the Headquarters Supreme Allied Commander Transformation (HQ SACT) NATO Urbanization Project Team for *The Three Swords Magazine*. The first, in Issue December 2015, discussed the urbanization challenge and initial conceptual work. The second, in Issue January 2017, discussed key messages from the urbanization

conceptual study and the design and execution of an urbanization seminar wargame conducted in the fall of 2016. The conceptual study was Phase I of the urbanization project. This article presents Phase II—development of a capstone concept for urban operations—which was delivered to the Military Committee (MC) at the end of November 2018.

Background

In November 2014, the MC tasked Allied Command Transformation (ACT) in the lead, and Allied Command Operations (ACO) in support, to conduct a conceptual study on urbanization. ACT commissioned 12 research papers examining physical, meteorological, technological and human aspects and their implications, and conducted a limited objective experiment. The detailed study, delivered

in March 2016, showed that NATO needed to enhance and advance its methods of operating doctrinally, organizationally and materially, as well as its leadership and training, essentially across the spectrum of doctrine, organization, training, materiel, leadership, personnel, facilities and interoperability (DOTMLPFI).

In April 2016, the two NATO Strategic Commands (SCs) were tasked to refine and condense the study, taking into account the upcoming urbanization wargame. Results of that wargame were reflected in the refined study delivered in March 2017, which laid the foundation of the November 2018 capstone concept.

Back in May 2017, the MC noted the refined urbanization study to present a solid base for the project, and tasked the SCs to develop an overarching capstone concept named "Joint Military Operations in an Urban Environment", to bridge future capability development, includ-



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ing operational and functional concepts, as well as a future NATO Urban Doctrine. The capstone concept is based on study, research, experimentation, analysis, and close collaboration with a large community of interest representing national experts and international organizations.

Impact of urbanization on NATO Alliance

The NATO Strategic Foresight Analysis¹ (SFA) has identified urbanization as a key security trend with a potential to significantly impact NATO. The rapid pace of urbanization combined with the lack of effective governance in large and megacities (with an urban population greater than 10 million) are expected to result in instability, with the resiliency of urban areas becoming a national security issue for many nations. Increasing urbanization might lead to resource competition, contested ownership and control of critical infrastructure, and increased dependence of coastal urban areas on sea lines of communication. As a consequence, increased urbanization will require NATO involvement in urban areas in the future.

Cities are also increasingly becoming prime targets of military, political and terrorist attacks, and are environments of violence and conflict. It is not a matter of "if" but rather "when" NATO will be involved in urban operations across the spectrum of conflict from humanitarian to stabilization missions and combat operations. Precisely because urban operations remain complex, challenging, and difficult to sustain and win, cities are also the most likely environment for a serious adversary to challenge NATO. This grants urban operations special attention and its own set of conceptual operationalization, specific doctrine and training, and adapted weapons and equipment.

Urbanization seminar game

The 2016 NATO Urbanization Seminar Game² was a week-long conceptual discovery activity event held at the NATO Defense College. The

FUTURE CAPABILITIES

- /// Persistent Command and Control
- /// Vertical lift, rooftop landing
- /// Variable lethality weapons systems
- /// Rapid and light force protection
- /// Persistent autonomous ISR
- /// Enhanced information operations capability
- /// Multi-role urban vehicles
- /// Electronic warfare superiority
- /// Countering unmanned systems and platforms
- /// Access to Space-based systems
- /// Autonomous, persistent and non-contiguous sustainment
- /// Enhanced policing
- /// Advanced Cyber

game focused on an urbanization technology advanced scenario of a full-scale littoral urban operation in a high-intensity conflict, characterized by a hybrid threat in a fictitious city of 2035, as well as a "Road to War" between two nations. There were 112 participants from 15 NATO Nations and 14 Centres of Excellence, along with a number of academic and civilian urban subject matter experts (SMEs). Post-game analysis identified four essential key focus areas in order to operate and plan in an urban littoral environment: (1) agile organizations, (2) integrating into the urban system, (3) understanding the environment, and (4) concurrent multi-dimensional operations. These focus areas became the foundation for developing the NATO concept. Also taken forward were the identified capability gaps for each of the four areas.

Concept development

The concept was developed per the NATO Concept Development and Experimentation (CD&E) process. In 2018, concept writing workshops developed the structure and content of the document and a "concept test" assessed its logic and flow. Leading up to a validation wargame included a scenario design workshop, a main planning workshop, and a final planning workshop for the wargame rehearsal.

The matrix wargame

The NATO Joint Urban Operations Wargame was hosted by the Development, Concepts and Doctrine Centre (DCDC) at the Defence Academy of the United Kingdom, Ministry of Defence, Shrivenham UK, and designed by a core set of stakeholders, including national representatives. The week-long event had 78 participants from various NATO Nations, Partners and Centres of Excellence, along with a number of academic and civilian urban SMEs. The wargame aim was to validate the NATO concept and provide recommendations for further conceptual and doctrinal work. The wargame objectives were to (1) apply the key principles of the concept to assess their impact, (2) refine identified capability requirements, and (3) identify any operating and functional concepts that may be required in the future.

The wargame was loosely based on the "matrix wargame"³ methodology. Matrix games are free-form wargames focused on effects and consequences of actions. Game moves are declared in the form of verbal arguments that advance players' positions in the game, creating an overall shared narrative of events that can be woven together into a storyline. Each team declared actions in alignment with the aim and ambition of the role they were playing and described the intended effect of each action. In addition, the teams were asked to react (and counter-react) to the other teams' actions. Advantages and disadvantages of each move were discussed by all players. Based on the informa-

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tion presented and a dice-roll, the adjudicators determined the outcome.

The players formed different teams, representing different actors operating in the city. The Blue Team represented a NATO joint planning staff, with troops deployed in and around the city. The Red Team represented the adversaries in the city, which included a peer-like adversary, hybrid actors, and terrorist groups. Any civilian-orientated roles, for example the city mayor, city manager, NGOs and IOs, and the city civilian population (split by ethnicity) were role played in the Green Team. Adjudicators formed the White Team, and analysts were employed to observe, collect data, and draw conclusions. To increase the number of repetitions for data triangulation, two independent wargames were run in parallel. With two wargames, and three vignettes, the concept could be tested six times to reinforce any results. Each vignette consisted of four steps: (1) planning, (2) game play, (3) end turn—to wrap up play, and (4) facilitated discussion for the analysis.

The wargame framework was at the operational level in order to draw out strategic-level implications. It was set in 2035 in the fictional city of "Archaria", and covered three vignettes: (1) planning, preparing for, and deployment into the city; (2) offensive operations to eject enemy forces; and (3) transition to a stable civil authority. The content of the capstone concept was integrated into the wargame design. The "environment" was represented in the scenario; the "threat" was in the Red Team; the four key principles were converted into Blue planning guidance; and the capability requirements were expressed by future capability cards.

Two supporting models (*Archaria* and *Marvel*) were incorporated into the wargame. The *Archaria* model, developed by the NATO Modelling and Simulation Centre of Excellence, has a large amount of data and information about the city, including physical locations of most city services and infrastructure, and locations of NATO, and host nation and adversary military units. This information was displayed on an electronic map, negating the requirement for traditional paper maps and counters. By investigating the map, players could determine details about the city. For example, in the game, one of the Blue Team's move was to patrol an area of the city; a quick investigation of the *Archaria* model calculated the population residing in that area (more



Dutch troops exercise urban assault in Lithuania during Exercise SCORPION STRIKE 2018. Photo by NATO

than 2 million people), which could inform the conversation about how successful traditional patrols would be. *Archaria* was also able to capture any physical moves at each turn of the game, allowing the progression of the game to be captured.

The *Marvel* model, developed by TNO, a Dutch organization for applied scientific research, is a systems dynamics model depicting the resiliencies of the city of *Archaria*, and the interactions between them and any events (e.g. military action) in the city. The model analysts were able to show the 2nd, 3rd and 4th order effects of any actions by the teams during the game or discuss potential effects during the planning sessions. They captured the "state of the city" by describing it through various resiliency factors.

Matrix wargame results

The wargame achieved its aim and showed that the central framework required minor changes before concept delivery. Gameplay showed there is a need to leverage the city and the importance of resilience. It also provided recommendations for capability development across DOTMLPFI and insights on needed support-

ing concepts. There was a strong consensus in the wargame that the urban environment will be very demanding to any troops operating there. In a conflict situation, the environment gives many advantages to the adversary, and in a humanitarian situation, chaos will be confusing and disorientating. NATO must be prepared for this environment. No one would choose to enter such an environment in a conflict situation, due to the risks involved, but it may not be a choice, e.g., when the integrity of the nation is at stake, or the disaster is too large and beyond any single nation's capacity. It will take NATO a long period of concerted effort to be adequately prepared, and therefore the concept is needed now in order to influence NATO Capability Development in the future. To be successful, entirely new ways of operating are required; in other words, the concept calls for a mindset change.

Urbanization capstone concept

The Bi-SC Joint Military Operations in an Urban Environment Capstone Concept was developed in coordination with NATO and its Partner Nations, NATO Centres of Excellence,





Photo by Torbjørn Kjosvold, Forsvaret

in with collaboration by academia, industry, NATO Science and Technology Organization, Operations in Contested Urban Environments (OCUE) Panel, International Committee of the Red Cross (ICRC), and the City of Norfolk. The concept gives strategic-level guidance, considers city size, climate, and development level, covers all domains and NATO's core tasks. Moreover, the concept looks into the future, projecting out to 2035, while also taking into account current challenges, and it articulates implications and provides military advice on capability requirements. This concept does not, however, provide tactical guidance. To effectively conduct joint urban operations, NATO Forces will require continuous interaction with the urban environment as explained below:

1/ Understanding the Urban Operating Environment: Military forces must understand the urban environment in which they are operating, the nature of the conflict and the adversary. As cities have an ever-changing complex network of physical and human features and relationships, determining their dynamics represents a significant challenge. Forces must also understand the threats and challenges within the urban environment.

2/ Force Agility: Military forces are agile, enabling them to operate effectively in the dynamic and complex operations environment. They are flexible, adaptable, and responsive as the situation changes.

3/ Interaction with the Urban Environment: Military forces must interact effectively with the urban environment's human systems (governance, civil society and institutions) and its physical systems.

4/ Functional Characteristics: Clearly urban operations must be viewed, planned, and conducted from a multi-dimensional perspective. The environment will be multi-domain with land, air, maritime, Space, cyberspace and electromagnetic aspects. They must address a spectrum of mission sets across a complex multi-dimensional environment facing a multi-faceted adversary.

Capability requirements and going forward

Based on the characteristics of the future urban operating environment, the challenges associated with it and the implications for NATO success in the urban environment will require significant NATO adaptation across all lines of DOTMLPFI. The NATO Framework for Future Alliance Operations (FFAO)⁵ cites several instability situations, and the military implications thereof, that apply to the urban environment. NATO faces unique challenges should it need to operate in dense urban areas. The future urban battlespace will be more congested, more cluttered, more contested, more connected, and more constrained (the 5Cs). It is critical for NATO to think in this space and re-

main adaptable and resilient enough to operate in this most challenging physical and human environment. Maintaining, and even expanding, the community of interest is vital to move forward. The concept is a starting point for real change. Follow-on work could include associated operational and functional concepts as well as a NATO Urban Doctrine. Implementation will require adaptive capabilities and adoption of new technologies. In addition, there is a need to integrate urban operations into the NATO individual training and exercise programmes to include increased participation by non-military actors and explore innovative training techniques to include the use of immersive training environments and gaming technology. †

About the authors

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ENDNOTES

- 1 HQ SACT Strategic Foresight Analysis, 2017 Report, 4 October 2017
- 2 Urbanization Seminar Game Final Experiment Report, HQ SACT 5000/TSC FEE 0010/TT-161156/Ser: NU0190 (INV), 17 March 2017
- 3 Matrix Games for Modern Wargaming. Curry, Price 2014
- 4 Veldhuis, G. A., van Scheepstal, P., Rouwette, E., & Logtens, T. (2015). Collaborative problem structuring using MARVEL. *EURO Journal on Decision Processes*, 3(3-4), 249-273.
- 5 Bi-SC - Framework for Future Alliance Operations (FFAO) 9 March 2018