Directorate of Land Strategic Concepts

FUTURE ARMY EXPERIMENT

Operations in the Urban Battlespace

Fort Frontenac
Kingston
May 2002

PREFACE

The Chief of the Land Staff (CLS), having been briefed by Director of Land Strategic Concepts (DLSC) on the results of DLSC Experiment 01 during the spring of 2001, directed DLSC to explore anticipated challenges for a Future Army conducting High End View 2 operations[1] in urban terrain.

Recalling experiences and insights gained during Experiment 01, and using conditions and requirements set out in DLSC's publications—*The Future Security Environment* (August 1999) and *Future Army Capability Requirements* (January 2001)—DLSC set out to build upon insights gained from the Canadian Urban Operations Working Group, NATO Urban Studies, the United States Marine Corps Project Metropolis and ongoing studies within military and civilian research organizations of our Allies.

DLSC Experiment 02, Exercise URBAN CHALLENGE, examined operations in an urban battlespace by three Experimental Forces (EXFOR): EXFOR A, utilizing evolutionary advances; EXFOR B incorporating more revolutionary advances; and EXFOR C, representing the current Main Contingency Force with minor, incremental improvements.

The experiment used a seminar wargame approach to examine the action, reaction and counter-reaction of forces engaged in urban operations in order that three different sets of capabilities could be compared and contrasted. The results of related studies were made available to assist in deliberations.

The aim of this summary report is to highlight initial judgements and insights from a preliminary analysis of the experiment. In some cases these judgements and insights build upon those of DLSC Experiment 01; in other cases, they are unique to DLSC Experiment 02. A more comprehensive operational research report will be issued at a later date.

BACKGROUND

Experiment 01—Operations in the Expanded Battlespace

DLSC Experiment 01 assessed the ability of two force constructs—EXFORs A and B—in an open, expanded battlespace to counter a traditional military force structured in a conventional manner and equipped with the typical array of weapons found in a GENFOR Motor Rifle Division. EXFOR A's assets and capabilities reflected an evolutionary approach to the Future Army model, whereas EXFOR B's weapon, communication, sensor and command support technologies represented a quantum leap forward. EXFOR A had three Battle Groups (BGs); but to contrast its inherent advances the more technologically sophisticated EXFOR B was given only two BGs.

Both EXFORs achieved success in shaping; however, EXFOR B was better able to exploit its long-range assets, compensating for the fact that it had fewer soldiers than EXFOR A. Whether or not these assets would be as dominant in a complex battlespace was an issue to be examined in Experiment 02.

Two Views Of Future Conflict (NATO)

View 1

Conventional conflict between national entities

View 2

Asymmetric conflict between state and armed bodies that may not be organized armed forces

Experiment Objectives

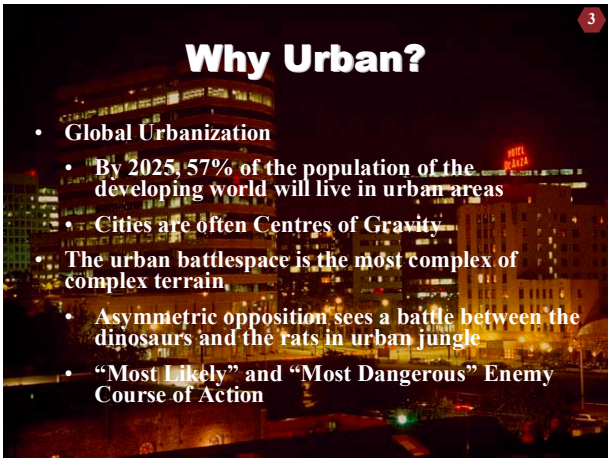
- Experiment 01 (Spring 01): To measure differences in capability between evolutionary and revolutionary battle forces operating in the expanded battlespace circa 2020

- Experiment 02 (Spring 02): To measure differences in capability between current, evolutionary and revolutionary battle forces operating in the urban battlespace circa 2025

[1] High End View 2 refers to conflict against a sophisticated well-armed, non-state enemy. An example would be the Chechen Wars.

General

Global urbanization over the next 20 years will create an increasingly demanding operational environment for military forces. Military and para-military forces posing threats to national or regional order and stability may choose to fight in urban areas to offset the tactical superiority of the more sophisticated military forces. Unable to avoid urban areas, commanders and soldiers will have to confront and take decisive action against hostile forces operating in a multi-dimensional battlespace characterized by the presence of non-combatants and complex infrastructures. Any Army that cannot operate effectively in both urban and open battlespaces will be of limited utility. This assessment has significant implications for modern military forces given that most armies are currently structured for operations in the open, expanded battlespace.



Most nations are responding to this new reality by pursuing initiatives in doctrine, technology, training and capability so that urban operations can be conducted in such manner that casualties can be minimized, collateral damage avoided, and operations successfully completed without unnecessarily complicating post-conflict, peace-restoration activities. To this end, the Canadian Army participated in a NATO Urban Operations Working Group and established its own Urban Operations Working Group, and Experiment 02 built on that body of work.

Traditional Urban Approaches

- **Cordon and bypass**
- **When urban fight is inevitable we attempt to relive Ortona:**
  - **Firepower emphasis**
  - **Focused on seizing territory**
    - **House to house, block by block fighting**
- **Close combat is unavoidable**
  - **Manpower intensive**
  - **Focus on low level tactics**

Historically high casualties and collateral damage

Technology

The challenge for today's Science & Technology (S&T) community is to predict "technology winners" of the future, i.e. those technologies that will best support operations in this era of "Revolution in Military Affairs" (RMA). However, technological advances alone, will not be sufficient to ensure success in an urban, or any other type of operational setting. New technologies must be incorporated within new processes and executed by new organisational structures, to optimize the advantages they bring and ensure success in military operations.

From an extensive list of improved urban war fighting capability concepts, a subset of ten concepts was selected for examination during URBAN CHALLENGE. These concepts, with rudimentary prototypes already being studied, included tactical Unmanned Aerial Vehicles (UAVs), micro-UAVs, expendable micro-sensor networks, Unmanned Ground Vehicles (UGVs), multi-range multi-effects precision munitions, Non-Lethal Weapons (NLW), intelligent barrier area denial systems, future soldier systems including combat identification, and a Data Fusion Command Centre (DFCC).

During the experiment, each EXFOR was equipped with different levels of technological development and integration: low (EXFOR C), medium (EXFOR A) and high (EXFOR B). Differences were based on levels of autonomy and collaboration, connectivity, size, weight and/or quantity of individual technologies.

Change Opportunities

- Application of Manoeuvre Warfare concepts to Urban Operations
- Emerging key technologies

Tenets of a New Approach

- Change how we apply our strengths
  - Effects vice Firepower
  - Develop methods to defeat enemy that avoid block by block fighting focused on seizing territory
  - Focus use of limited soldier resources
- Reduce close combat risk by providing soldier overmatch

EXFOR A technologies were evolutionary in nature and in keeping with the current state of worldwide technology investment. EXFOR A concepts required a "soldier-in-the-loop" to analyse data and re-task systems to meet changing situations.

EXFOR B technologies allowed for a high degree of autonomy and collaboration between and among various systems and components. Generally, EXFOR B technological components had greater endurance, range and resolution, and were smaller, lighter, cheaper and more abundant than those of EXFORs A or C. If EXFOR A technological concepts could be described as "surrogates for the soldier's eyes," EXFOR B concepts could be described as "surrogates for the soldier's brain."

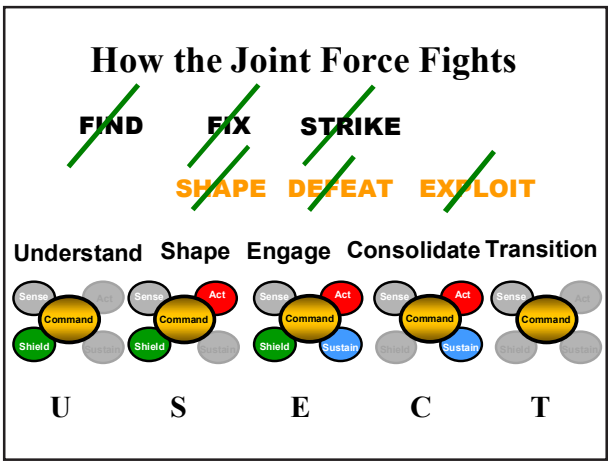
EXFOR C technologies were representative of those found in the Army of Today, with minor improvements. EXFOR C information gathering and processing technologies, and Situational Awareness (SA) sharing abilities, were less sophisticated than those found in the other two EXFORs.

System Concepts
EXFOR A versus EXFOR B

- **EXFOR A**
  - **Man-in-the-loop**
  - **Vertical Connection**
  - **Components**
    - **Larger**
    - **Heavier**
    - **Fewer**
  - **Surrogate for the Soldier's Eyes**
  - **Evolutionary advances based on existing technology developing at a relatively steady pace**
  - **Concepts and prototypes now exist**
- **EXFOR B**
  - **Autonomous**
  - **Collaborative**
  - **Horizontal Connectivity**
  - **Components**
    - **Smaller**
    - **Lighter**
    - **More of them**
  - **Surrogate for the Soldier's Brain**
  - **Revolutionary advances that may be possible with considerable additional R&D investment**
  - **Some technology breakthroughs needed**

USECT

The acronym "USECT"—Understand, Shape, Engage, Consolidate, and Transition—a more universal battlespace model than Find, Fix, and Strike—was first introduced by the US Department of Defense in a joint doctrinal publication on operations in an urban environment.[2] The USECT framework was used during URBAN CHALLENGE in keeping with NATO's Research and Technology Organisation (RTO) study on urban operations recommendations.



[2] U.S. Department of Defense. Joint Staff. *Doctrine for Joint Urban Operations.* Joint Publication-3-06. 2nd Draft, October, 2000.

The continuous need to UNDERSTAND the battlespace includes a requirement to: gain and process information about hostile forces, the physical environment and non-combatants; anticipate second- and third-order effects of actions; and analyze geo-political, cultural and demographic aspects of the area of operations. To SHAPE through actions taken on the physical and moral planes[3] is to set conditions and the environment for subsequent action. ENGAGE actions include combat, humanitarian assistance and disaster relief efforts applied at decisive points affecting hostile force centres of gravity. Having achieved progress or objectives, commanders then CONSOLIDATE to protect what has been gained and retain the initiative for subsequent activities, before control is passed to local authorities/international organisations during the final, TRANSITION phase.

The USECT framework when applied in an urban operation setting promotes unity of purpose, assists in military and non-military organisation coordination, and aids in understanding the complexities of urban operations.

THE EXPERIMENT

Aim and Objectives

The aim of URBAN CHALLENGE was to provide the CLS and the Army staff with a basis for considering long-term capability requirements through testing of urban operations future concepts. Major objectives of the experiment were as follows:

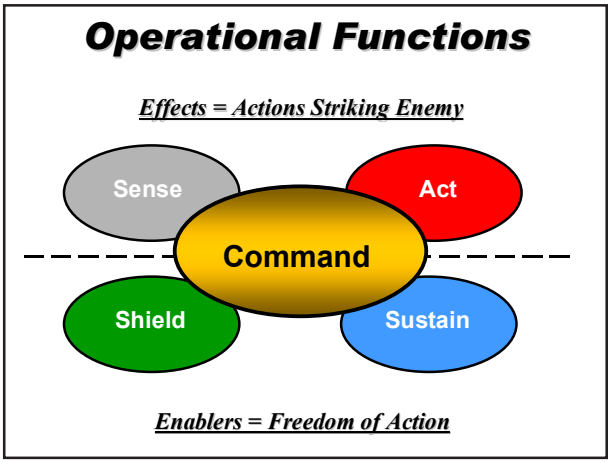
- To explore new concepts and technologies that will create or strengthen Army capabilities to fight and win in the urban battlespace.
- To gather insights and observations for Future Army concept development.
- To provide information that will assist in guiding technological investigation and research and development initiatives.

Hypothesis

The URBAN CHALLENGE hypothesis, linked directly to Experiment 01, read as follows: "A force optimized for the open, expanded battlespace can be effective in operations in a complex, specifically urban, environment." This hypothesis was to be proved, or disproved, by employing the EXFORs from Experiment 01, significantly optimized for open battlespace warfare and testing them in a challenging urban scenario.

Use of Operational Functions and Major Questions

Research work on the Future Army focuses on five operational functions: *Sense, Act, Shield* and *Sustain*, with *Command* as the nexus. Together they address the integrated capabilities of the future battlespace in the physical and moral planes. These five operational functions were used as the framework to develop major questions (Annex A) that guided data collection in Experiment 02.



Evaluation Methodology

URBAN CHALLENGE used a combination of professional military judgement and quantitative formulas to determine outcomes of engagements. Unlike many other experiments conducted, it did not seek to determine the outcome of combat through

[3] The physical plane includes subsets such as the electromagnetic, cyber and any activity, matter or material that relates to the laws of physics or nature. The moral plane is the opposite, relating to those forces of psychological or mental nature such as the intangibles of will and national resolve. In this view, DLSC differs from others authors who see electromagnetic and cyber planes as not part of the physical plane.

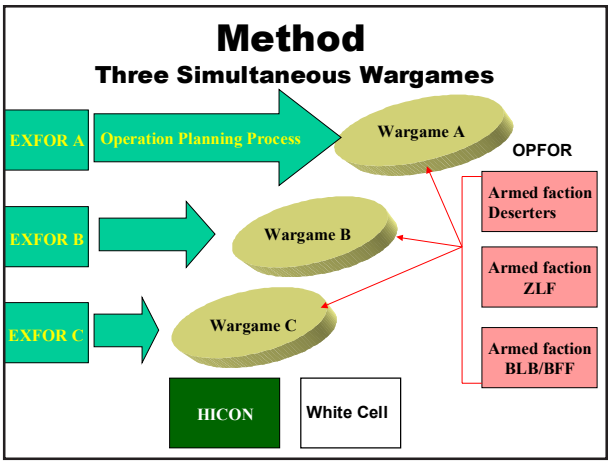
personnel and equipment loss ratios, or to find clear winners and losers. Rather, evaluations of individual interactions were used to promote discussion and challenge participants to identify advantages and disadvantages arising from technologies and concepts employed. Following each round of game play, an After Action Review (AAR) captured initial insights.

Four Excel spreadsheets were prepared to assist in game board interaction evaluation. These dealt with force-on-force combat at platoon level, casualties sustained in building clearance operations, casualties to indirect fire in open urban areas, and losses to small-scale sniper and ambush attacks. Use of simple Excel formulas enabled exercise participants to maintain exercise momentum while providing a mechanism to capture interaction results.

Other evaluation methodologies, including participant questionnaires, AAR records, and control staff synopses, were employed to develop findings. Although a seminar wargame is not suitable for traditional quantitative analysis, it proved to be an excellent forum to discuss concepts, tools and intuition during URBAN CHALLENGE.

Participants

Students graduating from the Transition Command and Staff Course conducted by the Canadian Land Forces Command and Staff College served as commanders and staff of the EXFORs. Trained to apply the Operational Planning Process (OPP) in a variety of settings, they provided unbiased insights on future concepts, structures and capabilities of significance to Future Army development. Other participants came from a variety of agencies, both national and international, civilian and military, including the following: United States Army, United States Marine Corps, United States Department of Defense, Australian Army, British Army, International Committee of the Red Cross, RAND Corporation, Royal Military College of Canada, and various Canadian military staff directorates and schools (Annex C). Total participation exceeded 130 personnel.



Game Organisation

URBAN CHALLENGE consisted of three simultaneous seminar wargames. Participants were assigned command and staff appointments at both formation and BG level, or in one of three competing armed Opposing Force (OPFOR) factions. Participants staffing White Cell positions represented local civilian and police department officials, international and non-governmental organisation authorities, and staff members of pertinent offices of the United Nations. Higher Control (HICON) input was provided from cells representing NATO, Canadian national HQ, Joint Task Force (JTF) HQ, flanking formations/units, and specialist advisors. An Exercise Control (EXCON) staff consisting of the exercise director, exercise co-ordinator, game board controllers and AAR co-ordinators oversaw exercise conduct and lesson gathering. Operational research staff members, subject matter experts, observers and support staff also made significant contributions throughout the exercise.

Scenario

Set in 2025, the scenario was based on a NATO Coalition response to threats to peace and stability posed by well-armed groups of guerrillas and military deserters in Batumi Province—a disputed territory of a NATO member in the region (Annex C). The NATO contingent's mission was to restore order, disarm factions and bring about conditions for a peaceful political transition as directed by United Nations

Security Council Resolutions (UNSCRs). Within the Coalition's campaign plan, the Canadian Contingent's Area of Operations (AO) included a portion of the troubled region's capital.

Vignettes

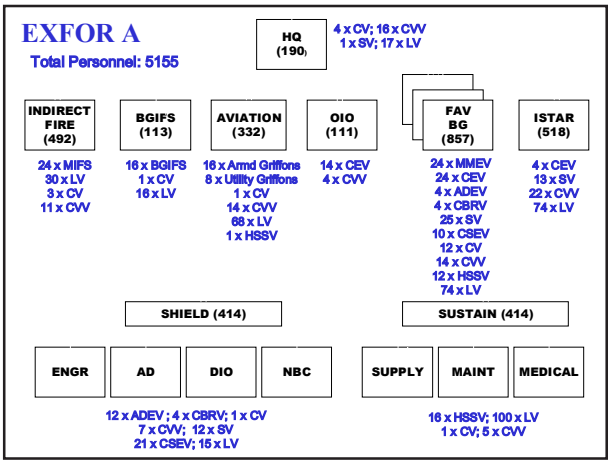
Three separate vignettes, not connected in time or sequence, provided the experiment framework. The first vignette was a Crisis Response situation requiring the development of a formation level concept of operations for initial EXFOR deployment inside the capital. The second and third vignettes respectively were defensive and offensive operations that included BG level concepts of operations. Each vignette shared the same socio-political and geographical setting; however, they were not interrelated in terms of experimentation conduct and flow (Annex C).

EXFOR CONSTRUCTS

EXFOR A—Evolutionary Design

A brigade-sized formation of approximately 5,200 personnel, EXFOR A possessed moderately evolved technology. Sense and Command functions achieved a considerable leap forward in providing an integrated network able to fuse information from a variety of sources. EXFOR A had a high level of SA that included "soldier-in-the-loop" sensor systems.

EXFOR A had three Future Armour Vehicle (FAV) BGs. Each FAV BG contained two sub-units equipped with Multi-Mission Effects Vehicles (MMEV), two sub-units equipped with Close Effects Vehicles (CEV), and sub-units with Sense, Shield and Sustain assets. The MMEV, essentially a Light Armoured Vehicle (LAV) armed with a 105 mm electro-thermal chemical gun and Low Level Air Defence (LLAD) missiles for anti-tank or Very Short-Range Air Defence (VSHORAD) tasks, represented the evolution of the tank. The CEV, a LAV variant armed with a 25 mm gun, a general-purpose machine gun, an automatic grenade launcher and four LLAD missiles, represented a future infantry vehicle. EXFOR A, with its three FAV BGs, could generate 576 soldiers, not including vehicle crews, for dismounted operations.



EXFOR A was supported by 155 mm tube artillery firing Precision Guided Munitions (PGMs) with a 40 kilometre range, 120 mm mortars that could fire PGMs to a range of 15 kilometres, and armed aviation consisting of two flights of Griffon helicopters. These helicopters had an Electro-optical Reconnaissance, Surveillance and Target Acquisition (ERSTA) suite, 8-16 Hellfire missiles with an 8 kilometre range, and 38 laser guided Canadian Rocket Vehicle (CRV) 7 rockets with a 7 kilometre range.

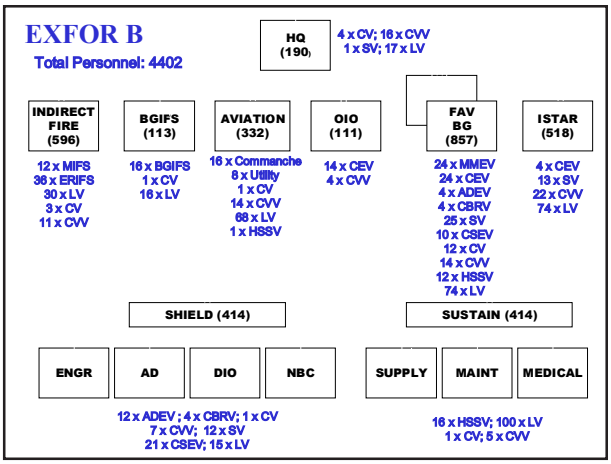
Specific additions for the Sense function included formation and unit level UAVs that included micro-UAVs down to the sub-unit level. UGVs and an expendable micro-sensor network feeding information into the Effects Coordination Cell (ECC)/ DFCC, were also incorporated into BG Sense capabilities to enhance SA and provide a unified view of the battlespace for mission planning.

NLWs, with area denial and anti-personnel capabilities, were deliverable by individual soldiers or through munitions effects. Intelligent barriers delivered by artillery, UAVs, UGVs, vehicles or soldiers could control personnel and vehicle movement. Stand-off, scalable PGMs, surface- or air-launched, and either directly or indirectly fired, provided a means of delivering precision effects.

EXFOR B—Revolutionary Design

A brigade-size formation with approximately 4,500 personnel, EXFOR B was the most technologically advanced of the three EXFOR constructs. In designing EXFOR B, advantage was taken of emerging technologies and their full potential capability. EXFOR B contained numerous improvements to the system concepts present in EXFOR A, including improved extended range assets in artillery rocket systems and attack aviation. Its Sense capabilities had greater endurance, range and resolution, and were smaller, lighter and more abundant. Soldier systems were fully integrated with human ergonomics and were linked to the sensor system for improved SA. Many Sense and Command systems had a higher degree of autonomy and collaboration technology, and did not rely heavily on human involvement and interface to analyse data and re-task systems. These Sense and Command systems provided an integrated network able to fuse information from multiple sources, ranging from individual soldier to satellite imagery.

In terms of unit structure, EXFOR B had only two FAV BGs, relying on unparalleled levels of SA and a common operating picture down to section and soldier level to compensate for its numerically fewer troops. EXFOR B was structured to determine whether technology could not only enhance human performance but replace it in selected areas. The four manoeuvre sub-units of the two BGs, not including vehicle crews, could generate a total of 384 soldiers available for dismounted operations.

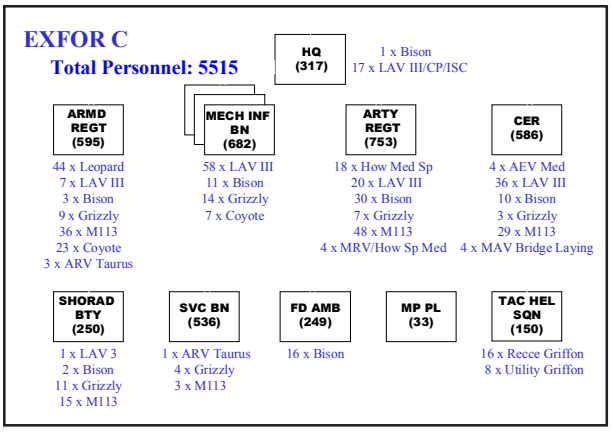


Individual soldiers possessed a soldier level SA system that included fully integrated communications, indoor/outdoor Global Positioning Navigation (GPS), combat identification and mission coordination functions incorporated in a heads-up display format. Protection was enhanced by NBC/ industrial toxic material detection and a medical vital signs monitor included in the overall systems concept.

Supporting EXFOR B were two flights of Commanche helicopters able to process up to 200 targets and kill T-90 main battle tanks at a range of 8 kilometres. EXFOR B commanders could also call upon the fire support of the US Army-style High Mobility Artillery Rocket System (HIMARS) with a range extended to 100 kilometres. Mortars, howitzers and rockets fired PGMs, most of which were scaleable. As in EXFOR A, a variety of scaleable effects, including both area and individual NLW systems and intelligent barriers, were available.

EXFOR C—Current Main Contingency Force

A brigade-sized formation of just over 5,500 personnel, EXFOR C was based on the current Main Contingency Force (MCF) construct.



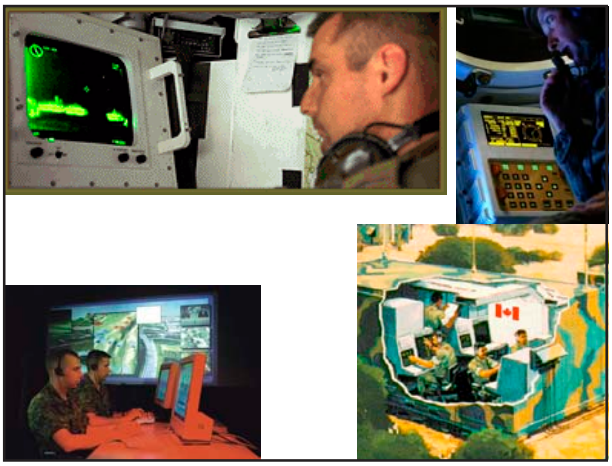
EXFOR C was based on present day structures of three infantry battalions, an armoured regiment, an artillery regiment, and a field engineer regiment supported by an aviation squadron and a combat service support unit. EXFOR C was incorporated in the experiment to serve, as a baseline to help determine if additional capabilities provided to EXFORs A and B were significant combat multipliers. The three infantry battalions provided a total of 864 soldiers available for dismounted operations. The information flow into EXFOR C's all source centre and the information processing were less sophisticated than in the other EXFORs.

FINDINGS

Command

General. The USECT framework was useful for commanders visualizing major activities, efforts, and battlespace understanding, shaping and engaging in an urban setting. During the experiment, Consolidation and Transition activities were not fully explored; they were, however, recognized as valuable in framing gateways to end-states. The simplicity and broad application of the USECT concept were useful for co-ordinating joint, interagency and CIMIC activity.

Exercise of Command. Widespread presence of high-technology support throughout EXFORs A and B provided the individual soldier with heightened SA and a significant role to play in the overall sensor system. Commanders, capable of gaining quick access to detailed information on events or developments affecting any part of their AO, were confronted with a *Command* choice: devolve command decisions downward or exert directive control. Alternative means of taking advantage of the intrinsic strengths of a mission command philosophy were debated, but the issue was not resolved. Consensus was reached on the need for the Army's professional military education system to keep pace with developments in *Command* capability and application in an urban environment. The possibility that heightened SA at sub-unit level would permit flattening of the command hierarchy, through elimination of platoon or troop headquarters, and streamlining of information passage was deemed to be worthy of further investigation.



Decision Support. EXFOR A and B sensor systems presented true order of magnitude improvement opportunities over those of EXFOR C. It was agreed that improved SA information at all levels, however, will not free commanders from a continuing need to rely on their experience, judgement, intuition, and an understanding of technology limitations to make sound decisions.

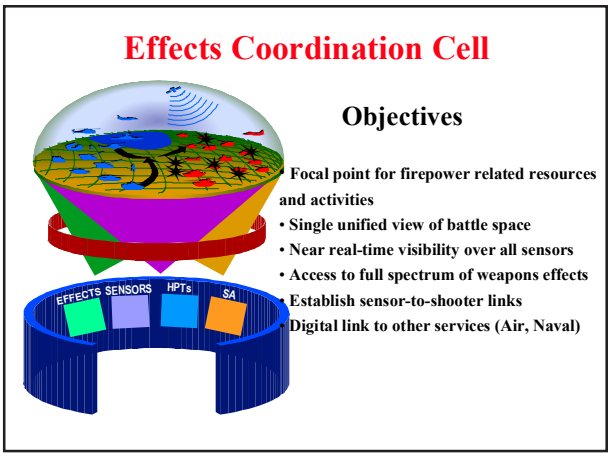
Physical and Moral Planes. For swift decisions and appropriate action, it was found that understanding based on accurate data and assessments on armed factions, non-combatants and the physical nature of the urban area must be sound. Within the

physical plane, sensors will be able to provide information concerning physical events and activities; however, the intangibles of the moral plane, i.e. human intent and perceptions, will continue to prove more difficult to discern.

Commander's Critical Information Requirements (CCIR)/IPB Shift. Linked to the difficulty of sensing human intent is the CCIR focus shift from "geography"—terrain and its impact on operations involving a heavily armed manoeuvrable enemy force in the open, expanded battlespace—to CCIRs related to "demography"—culture, presence and intentions of hostile and non-hostile inhabitants exploiting or living in an urban battlespace. Analysts working on CCIR issues will need a high level of cultural awareness, HUMINT input, effective data fusion technology and data processing practices to answer CCIRs. Improved IPB methods and supporting technology are required.

Commander Influence. Not surprisingly, nearly unanimous opinion was expressed that commanders will need to exert personal influence and share battlespace dangers in an urban environment. Professional judgement and personal interaction of commanders will still be important in the era of the ECC, from which commanders can view vast amounts of information about the entire AO and deal directly with subordinates by video tele-conference technology. Commanders will require "on the move" SA that permits greater flexibility to exert personal influence, retain SA and support subordinates actions.

Reach-Back. The viability of detaching ECC elements to the rear, including out of theatre, as a reach-back system was discussed, but until a reliable ECC reach-back system can be developed, use of such an approach was not considered acceptable. Notwithstanding, the advantages of perhaps more numerous, smaller, mobile headquarters were recognized.



Data Fusion Command Centre. A clear requirement for unit commanders to have a DFCC that fully addresses mission planning needs of the urban environment was noted. It was acknowledged that the DFCC concept was not specific to "urban" operations. What was considered essential was for the DFCC to be able to collect and synchronize information on the urban landscape and infrastructure, threats and potential threats, and non-combatant presence from unit and sub-unit sensors, soldiers, higher level sensor feeds, and higher level intelligence reporting/SA development portrayal. The DFCC was viewed as a means of expediting assessment production for SA depiction on two- and three-dimensional images, supporting decision-making and wargaming, and developing sensor task matrices.

Force Protection and Task Performance Balance. Striking the balance between force protection and performance of mission essential tasks was expected to remain an area in which commanders must personally weigh risks versus gain. Potential for high numbers of friendly and non-combatant casualties in urban operations will compound this challenge, even with the advent of new PGMs and improved sensors. All EXFOR commanders cited physical proximity and interaction with the population as the best means of understanding the city and its people. Accordingly, they established several large camps supported by a quick reaction force within the urban area. The addition of various high-technology sensors providing real-time

information to assist in securing base camp areas, and use of a soldier SA system, were seen as deterrents and force protection multipliers.

Sense

General. The importance of both operated and unattended *Sense* assets was examined throughout the experiment with a view to determine which sensors were of most use in an urban setting, at what level they were most useful, and how data flow should be controlled to promote SA at all levels.

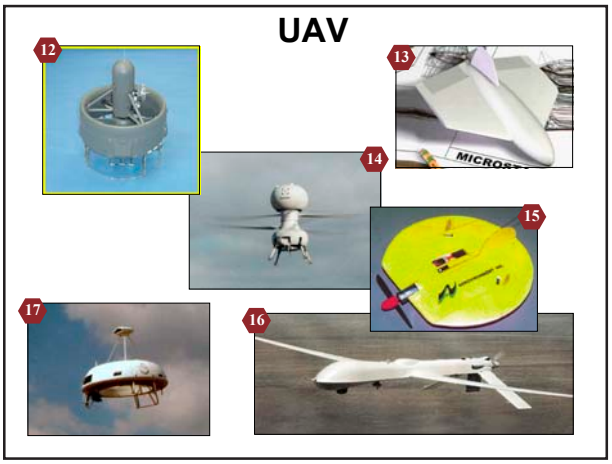
OPFOR Sense. OPFOR factions relied on a variety of concealment, deception and data flooding techniques to avoid detection, mask presence and conceal intentions. OPFOR overt and covert *Sense* and counter-*Sense* techniques included the following: exploitation of superior OPFOR knowledge of the terrain and culture; use of civilian pattern vehicles and normal street clothing; exploitation of routine civilian activity patterns; use of hidden ammunition caches and safe houses; use of small groups to conduct actions; use of Internet web-cameras and other unattended ground surveillance means to free guerrilla members for more active operations; exploitation of information available on the Internet, in news broadcasts and gathered from commercial communication intercept devices; use of reliable HUMINT sources; spread of disinformation and other PSYOPS messages; use of garages and lower-floor hiding areas to conceal armoured vehicles or position them for firing; use of urban area clutter, tunnels and high-rise buildings to thwart hostile aerial surveillance; use of relatively short ranges and reaction times in urban areas to exploit delays in the decision-making process; and exploitation of opportunities afforded when adverse weather conditions degraded the effectiveness of hostile *Sense* platforms and/or sensors. Some OPFOR elements openly conducted activities, using the shielding presence of supportive civilian crowds, refugee movement or non-governmental organisation (NGO) facilities to frustrate EXFOR targeting efforts and legitimize the OPFOR cause.

EXFOR Sense. All EXFOR variants were greatly challenged by the wide range of *Sense* and counter-*Sense* practices employed by OPFOR factions. No specific type or amount of technology available to any EXFOR variant could provide real-time, deception-free, complete SA or thwart all OPFOR *Sense* capabilities. Notwithstanding, EXFOR B with its high technology means to locate, identify, assess and react to hostile forces was best suited to react to OPFOR *Sense* capabilities.

Sensor Mix and Allotment. Having a mix of sensors and platforms from formation down to soldier level was important in all EXFOR variants, with EXFOR ability to confront OPFOR elements on EXFOR terms defined in large measure to the availability, distribution and sophistication of EXFOR *Sense* capabilities. Sensors could not reduce the number of tasks requiring resource commitment, but they were able to provide coverage in urban areas where insufficient troops were available to meet all tasks. Sensors, particularly those with an all-weather, 24/7, real-time download capability and supporting bandwidth, were able to provide much needed information as far down the chain of command as SA receiver-transmitters existed. It was recognized that dismounted soldiers should not be overburdened with sensors; nonetheless, a requirement existed for simple, rugged sensors operable by non-specialists to be available to soldiers at section level to promote and enhance force protection, efficient troop employment and thorough SA development.

Unmanned Aerial Vehicles (UAVs). UAV presence throughout the fielded force, from formation down to at least sub-unit level, was considered an important force multiplier even if UAVs themselves were not considered mission essential. With an ability to deploy UAVs quickly and enable those desiring SA detail to tap into real-time UAV data feeds, commanders possessing UAV assets were better positioned to acquire more comprehensive information than commanders who lacked UAV assets to direct against CCIRs. Not only could UAVs provide SA

using a number of sensors, they could also support attainment of objectives by serving as radio rebroadcast assets, devices to cue other sensors or reserve forces, resources to deploy micro-sensors and detection/identification "tags," and quick-reaction precision-strike assets. The need to employ UAVs at lower altitudes and slower speeds, making them more vulnerable to destruction and disruption, particularly during daylight hours, pointed to a preference to have numerous, small, inexpensive, single-sensor UAVs. Availability of only a few expensive, multi-sensor UAVs in a commander's inventory of resources was viewed as an inhibition to UAV use.



Unmanned Ground Vehicles (UGVs). UGVs were not considered to be as multi-functional as UAVs in an urban setting; however, they too had a role to play in future military operations. In high-risk settings where momentum was stalled or being slowed, UGVs could be deployed to assist in locating hostile forces, determine whether obstacles posed dangers to advancing troops or civilians, or assist in disposal of explosives or unexploded ordnance. With the aid of sensors, UGVs could also be positioned and cued to destroy detected high payoff targets, thereby enhancing tactical level force protection.

Expendables, Micro-sensor Networks and Unattended Ground Sensors (UGS). These were viewed as mobility enablers, freeing troops from static positions of observation to take more active roles in urban operations. The ability of relatively inexpensive systems to cue other sensors or elicit a response from a roving patrol or reserve force was considered cost effective and combat power enhancing. The ability of these systems also to act as a sensor backbone was critical in overcoming urban clutter issues. EXFOR A systems could act as a backbone; EXFOR B could act as a backbone and collaborate to develop a contact within the entire sensor suite providing input into the DFCC.

HUMINT. As expected, HUMINT activity and reporting were important to the conduct of successful operations in an urban setting. Aside from established policy, doctrine, structure and training, HUMINT success was dependent on linguist and translator availability, link analysis software, military-community interaction success, mission legitimacy, and community contact at section level.

Aviation. Despite the significant air defence threat expected from hostile factions in an urban setting of 2025, aviation is expected to be able to provide communications support, enhanced SA and precision strike from stand-off positions. Improved Electro-Optical Reconnaissance, Surveillance and Target Acquisition (ERSTA) sensors that cover a wider area can eliminate the necessity for two aviation platforms to handle any given mission. Whether vulnerable aviation resources will remain an important SA asset in the future will depend on advances in, and acquisition of, UAV technology.

Act

General. Across the EXFORs, the requirement for significant numbers of dismounted soldiers, and the importance of non-lethal effects, scalable precision effects and Information Operations (IO) were highlighted.

OPFOR Act. OPFOR elements had a range of lethal and non-lethal *Act* options open to them, including the following:

- **Covert Actions**. Movement and stockpiling of arms and explosives, safe house operation, sabotage, subversion, espionage, black market activities, recruitment, training, wire-tapping/ eavesdropping, inter-faction cooperation/ assistance, political influence, and cyber attack.
- **Overt Actions**. Sniping, booby-trapping and mining, obstacle and strongpoint fortification work, road blocks, crowd rallying and marshalling, refugee movement interference, ethnic cleansing, neighbourhood control (e.g. identification checking, taxation, guarding), assassination, thermobaric round launching, fuel-air explosive use (flamethrower), bombing, hostage-taking, looting, tire burning, arson, rock throwing, mortar attack, small group attack, suicide attack, utility disruption/ destruction, chemical/ biological attacks and attack threats, and casualty infliction.

Although OPFOR elements were less restrained in their choice of *Act* options, they were restrained by the need to maintain popular support in their respective communities and avoid decisive confrontations with the much more militarily powerful EXFOR in their midst.

EXFOR Act. Guided by Rules of Engagement (ROE) constraints based on principles of military necessity, humanity, proportionality and discrimination, EXFOR commanders and troops relied to a great extent on superior technology and training to overcome OPFOR shielding strategies and defeat OPFOR actions.

Priorities/Manpower Limitations. All EXFOR variants, in particular EXFOR B, lacked sufficient dismounted soldiers for urban operations. Consequently, EXFOR commanders were required to determine which tasks required troop presence and which could be handled by reserve forces cued by *Sense* monitors. For many perimeter and vital point guard duties, *Sense* assets rather than troops were dedicated to detect trouble, intruders or other threats. For crowd control and cordon-search operations, EXFOR variants with the flexibility to deploy troops into a trouble area were the best equipped to take advantage of SA and respond effectively. It was determined that units and sub-units require a reasonable mass to accomplish tasks and maintain flexibility because of the density of non combatants and the physical environment.

Non-lethal Effects. Each unit in all of the EXFORs had a critical requirement to possess individual and collective NLW or effects, and specific ROE for their use. With these, commanders could separate hostile factions from non-combatants and have an escalatory means of dealing with individuals or crowds while minimizing casualties and retaining flexibility in task execution.

Information Operations. The importance of a comprehensive IO campaign that featured PSYOPS capabilities came to the fore. OPFOR factions and EXFOR expected attempts by all parties involved in the conflict and its resolution to use the media as part of a

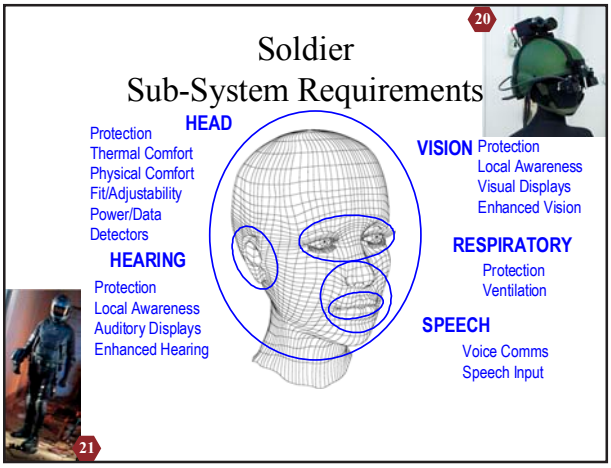
PSYOPS campaign. All factions recognized that future media capabilities could include privately controlled UAVs with live video feeds and other real-time means that pose both security risks and opportunities that could be harnessed. The need to influence local populations and world opinion, while denying hostile factions use of safe havens either locally or globally, was deemed critical to EXFOR success. This was acknowledged to be a strategic responsibility that had implications and application at formation and unit level.

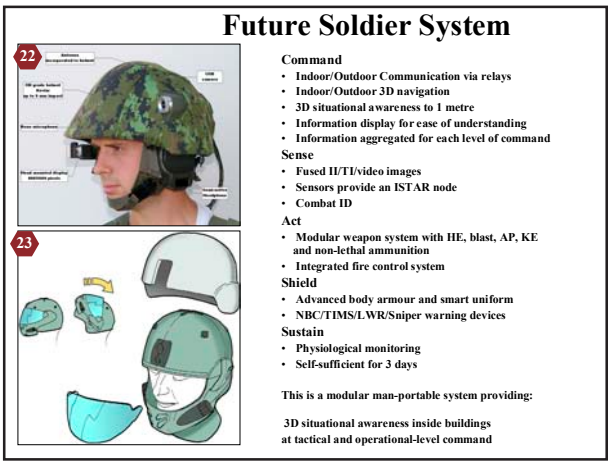
Cyber Operations[4]. Judicious attack against specific hostile computer and communication systems of the armed factions, their supporting agencies, and possibly sponsoring nations was identified as a requirement deserving strategic level attention.

Freedom of Movement/Manoeuvre. EXFOR freedom of movement and manoeuvre were affected by urban congestion, transportation grid patterns, civilian traffic, obstacles established by armed factions, communication hub targeting, sniping threats, and refugee movement. Where freedom of movement/manoeuvre problems existed, EXFOR variants with lethal and non-lethal PGMs, long-range strike capabilities, and aerial or aviation support were best equipped to respond quickly against identified hostile elements. EXFOR SA and B used their enhanced SA capability to manoeuvre, re-route forces, infiltrate areas and avoid choke points to reduce risk, while EXFOR C was unable to achieve the same degree of mobility.

Dismounted Troops. Separation of soldiers from armoured vehicles is expected to remain a characteristic of urban operations in future warfare. Soldiers rely on vehicle platforms to provide protection, SA and data fusion support, communications, first aid support, firepower, manoeuvrability, mobility and rapid extraction/evacuation; separation from the vehicles diminishes or eliminates many of these soldier support systems. For dismounted soldiers to be truly effective, specific improvement that allows for robust SA and weapons/designator systems to target and guide effects in the close battle must occur. Tactical overmatch must be the aim to defeat and deter hostile elements in the dismounted battle.

Soldier SA. Critical to achieving overmatch in close battle is SA down to soldier level. Soldiers require a robust SA system with sufficient bandwidth to select and pull detailed, accurate and timely information pertinent to specific, immediate interests. It is essential that this system not push non-essential information, and that confidence in information accuracy remains high. Disabling features on information passage/reception are aspects that must be explored as the Army moves to reliance on digital information gathering, processing, dissemination and sharing throughout its force structure.





[4] Cyber Operations is a subset of IO that involves military actions relating to electronic communications networks and virtual reality. Source: Directorate of Army Doctrine

CIMIC. Interaction with, and cooperation from, NGOs and international organisations will continue to be important when dealing with a host of local issues, from refugee control to food distribution. All EXFORs exhibited a need for a permanent CIMIC organisation, staffed by professional engineers, technicians, logisticians, legal experts, and social scientists. In addition, dedicated CIMIC experts will be able to assist Future Army commanders understand the battlespace and help prepare for Consolidation and Transition stages of operations.

Confrontation—Crowds. Physical separation of hostile communities required troop presence, intelligent barriers, or other non-lethal means. Intelligent barriers worked in static locations, but where crowds could form spontaneously barriers were no substitute for mobile, armed soldiers cued by *Sense* assets.

Confrontation—Armed Factions. EXFOR variants able to detect armed factions presence, identify their locations, and quickly assess their intentions were able to respond rapidly with an appropriate counter. EXFORs A and B had the flexibility to continue monitoring, deploying troops or engaging with scalable PGMs or effects; EXFOR C could not achieve the same success due to a lack of sensors and effects options. The capability of delivering precise scalable effects that reduced collateral damage was assessed as important.

Shield

General. The importance of *Shield* issues to both OPFOR and EXFOR was clearly evident.

OPFOR Shield. OPFOR elements selected the urban area as the battlespace given its inherent shielding elements: the presence of physical structures, civilians, refugees, cultural landmarks, media, Internet communication access, and "urban clutter." Underground tunnels and sewage systems, interior spaces of buildings, and the height of vertical structures all posed physical barriers and impediments to many EXFOR *Sense* and firepower assets. Camouflaging many OPFOR members and actions was the cloaking provided by daily urban activities of ordinary civilians, refugees and traffic. If detecting and identifying OPFOR presence was made difficult by these aspects, the ready availability of secure communications and undetected Internet usage shielded OPFOR information passage and made difficult EXFOR attempts to decipher OPFOR intentions, forecast OPFOR timings, and interrupt or prevent OPFOR exploitation of mass media or Internet communication access.

OPFOR elements often effectively exploited these conditions, making use of political agitators, crowds, refugee movement, NGO/international organisation presence, and proximity to vital points or cultural landmarks to shield OPFOR elements from EXFOR detection and/or targeting. Complicating EXFOR attempts to bypass these *Shield* efforts was concern among EXFOR commanders that any EXFOR action or collateral damage that could be interpreted as excessive by the mass media or other observers would draw international attention and threaten support for EXFOR domestically, internationally and within the AO. For EXFOR, judicious use of PGMs, selection of appropriate PSYOPS messages, and use of non-lethal means of persuasion were viewed as important in the fight against OPFOR shielding tactics.

EXFOR Shield. EXFOR, too, relied on various *Shield* schemes and technologies to protect its forces and achieve mission success.

Physical Shielding. Inescapably linked to *Shield* is *Sense,* given the close association between sensor system warning and target cueing for

engagement. Across the EXFORs, combat and Combat Service Support (CSS) vehicles operating in forward areas needed improved protection from fragmentation rounds, sniper fire, rocket-propelled grenades, thermobaric rounds, fuel-air explosives, mine-blasts, and NBC/industrial toxic material threats. Combat troops benefited from having devices such as UAVs and UGVs that could warn of NBC contamination, scout dangerous routes and areas, clear obstacles and mines, and enter rooms suspected of housing hostile faction elements. Non-lethal barriers were assessed to be an effective way of controlling crowds and detecting intruders. All soldiers benefited from having advanced protective clothing and vaccines to ward off threats to health posed by ballistic rounds and fragments, chemical agents and biological viruses. Use of stand-off distances, video recording, remote obstacle deployment systems, and advanced PGMs shielded EXFOR personnel from encounters with hostile forces equipped for a close-in fight and accusations of inaccurate targeting practices. Of note, CSS units also required significant protection to move through insecure, urban areas. SA, comparable to that available to combat force elements, is required within the sustainment system to ensure that the system does not become the Achilles heel of a fast moving, technologically advanced combat force.

Issues pertaining to provision of force protection against those piloting crop dusters and other small aircraft, determination of appropriate levels of camp "fortification," and assessment of needs for HUMINT, counter-intelligence, field engineer, communications security, and military police personnel were discussed. Across the EXFORs the need at all levels to shield information collection, processing and dissemination hardware, software and communication lines was determined to be vitally important. Within EXFORs A and B it was assessed to be a critical vulnerability.

Availability of innovative camp shelter materials and construction methods that protect camps and enhance survivability, without giving a "defended fortress" appearance that can be exploited by hostile PSYOPS, was determined to be another innovative method of shielding a force from undue criticism.

Shielding against hostile attack on computer and communication systems of military forces, supporting agencies, and civilian infrastructure networks—both in theatre and in homelands—was identified as a requirement deserving strategic level attention.

Moral Shielding. As part of the EXFOR IO approach, a robust counter-PSYOPS/IO programme, a strong CIMIC effort, and pro-active media relations campaign were needed to counter OPFOR efforts to discredit EXFOR. Sound OPSEC procedures, adherence to ROE, and ethical behaviour by all members of the force made it more difficult for OPFOR to challenge EXFOR legitimacy. Use of non-lethal effects that could modify behaviour was viewed as one measure that could assist in achieving and maintaining moral high ground.

Related to shielding is the critical aspect of shielding a soldier's morale. Soldier morale and esprit de corps are built upon strong leadership, comradeship, sound training, maintenance of standards, good material support, and knowledge that family members at home are shielded from harm while receiving support from the extended military community. Safeguarding morale will remain difficult with hostile forces conspiring to erode it through hostile PSYOPS or physical actions. Active consideration of all aspects of shielding morale must be considered.

Sustain

General. *Sustain* issues were of great consequence to the EXFORs while of relatively minor significance to the OPFORs.

Replenishment. The nature of the threat and urban environment made it difficult to move soft-skinned vehicles without an extensive security force. Even then, the load, propulsion system and drivers of supply vehicles were at significant risk. One option considered was to have a BG sub-unit secure the replenishment operation for the remainder of the EXFOR. The complexity and difficulty involved in securing portions of even a relatively small urban area, coupled with the impact on tactical operations, however, precluded assignment of combat forces to such a role, either on a permanent or temporary basis.

Another approach, the one on which EXFORs A and B were structured, was to allocate sufficient sustainment resources to the BG to satisfy a given mission requirement and then either undertake a full replenishment or withdraw the force. It was recognized that having an increased amount of sustainment resources deployed greatly increased the security requirement within the AO of the BG and that the security environment could make this an unrealistic option. This problem might be reduced if units were self-sustaining for shorter periods and then withdrawn for refit and rearm activity. But this again presented serious concerns related to resupply vehicle movement through insecure areas. New concepts for resupply delivery and packaging are required to resolve this problem.

Use of aviation resources was also considered as a replenishment approach option, but one that had two main problems. Neither the threat to low-flying helicopters from difficult to detect man-portable air defence weapons nor the limited lift capacity of medium weight helicopters could be overlooked. During URBAN CHALLENGE, this was particularly true for EXFORs A and C, which had CH 146/*Griffon* helicopter lift limitations; EXFOR B had UH-60/*BlackHawk* lift availability and technology for GPS-guided, parachute airdrop delivery. Despite lower demands for many supplies while conducting operations in a confined urban AO, particularly by relatively static forces relying on sophisticated sensors to gather information and PGMs to strike targets with minimum ammunition expenditure, consumption quantities remained considerable.

Although ground movement of supplies posed problems, it was deemed to be a continuing requirement. Utilisation of a family of armed, armoured logistic vehicles, with a common chassis and modular variants to handle the full range of combat and other supplies, was the preferred replenishment approach option.

Medical Evacuation. Lack of both dedicated air ambulances and secure, land-based lines of communication for casualty evacuation proved to be problems during URBAN CHALLENGE. Air evacuation resources and casualty suits/bags to improve a wounded soldier's survival chances were selected as important evacuation aids to be developed and acquired. Finding a way to evacuate a soldier safely without dedicating two to four soldiers to support the effort was also assessed as being an important issue to be studied.

Recovery and Maintenance. Power needs, new system complexity, and special resource requirements for urban area conflict will bring to the urban battlespace service support provider a new dimension of maintenance and serviceability challenges. Recovery and maintenance issues for the Future Army operating in an urban battlespace include the following:

- Non-disposable UAV and UGV maintenance and power management concerns.
- Training and deployment problems, whether highly skilled technician/soldiers are used or civilian contractors are employed.
- Protected and expedient recovery capability needs, for both personnel and vehicle casualties.
- Self-analysis and self-repair technology, which must be embedded within future weapon and vehicle systems if the teeth to tail ratio is not to be negatively affected.

Major Judgements and Insights

General. Initial analysis of the findings has enabled DLSC to make the following judgements regarding urban operations of the future. These will be carried forward and examined comparatively with observations and data from other urban operations combat development work.

- **Technology, Troop Strength and Force Construct**. Technology will enhance individual and collective force capabilities, but will not replace the need for significant numbers of soldiers in complex terrain. Operations in URBAN CHALLENGE exposed numerous deficiencies in the EXFOR constructs, including the following:

  ⇨ All EXFORs, but especially EXFOR B (with only two BGs), required additional dismounted troops to meet the troops-to-tasks challenge.

  ⇨ EXFOR A and B units had the wrong balance of capabilities for urban terrain. Instead of two MMEV and two CEV sub-units, a BG in an urban operation would have been better served with one MMEV and three CEV sub-units.

  ⇨ EXFOR C was forced to park major weapon systems (which in themselves were of limited utility because of the lack of PGM capability) in order to create additional mounted and dismounted patrols.

- **SA, Information Gathering and Information Sharing**

  ⇨ Use of UAVs, UGVs, UGS, expendable micro-sensor networks, soldier SA systems, data fusion technology and advanced dissemination means down to the lowest levels of command will significantly contribute to operational effectiveness.

  ⇨ The ability to determine (*Sense*) intentions and perceptions of civilian populations will be essential for operations in any urban environment and merits R&D.

- **Dismounted Soldier Capabilities**. Soldiers operating in complex terrain will often be separated from their vehicles and require portable systems that provide them with both SA and the means to coordinate fires or effects.

- **Sense**

  - ⇨ There will be a desire to control, but not have dependency upon, full electro-magnetic spectrum dominance; and to deny the same to the enemy.

  - ⇨ Systems (surveillance and TA) will be required that reduce hostile force *Shield* advantages in the urban battlespace.

- **Effects**

  - ⇨ Sophisticated, long-range TA and PGMs will be required in order to achieve stand-off for engagement of armed hostile forces in high-risk confrontations. These capabilities will reduce the threat of casualties to own forces and non-combatants.

  - ⇨ Precision scalable effects will be decisive in shaping the battlespace.

  - ⇨ Area non-lethal effects, including IO, CIMIC and cyber operations capabilities, will be essential in order to pre-empt or neutralize hostile crowds or PSYOPS means.

- **Force Protection**

  - ⇨ The dilemma about whether to disperse troops to protect high value targets or to concentrate troops in order to protect the force will continue in future urban operation, meriting development of technological means to support both objectives.

  - ⇨ There will be a requirement for armoured CSS capabilities.

- **Sustain**. Technological advances will be needed to protect and reduce the demand for combat supplies. Innovations for R&D study include the following:

  - ⇨ Water extraction and purification systems for individual soldiers and vehicles.

  - ⇨ New fuel system approaches, where two or more stable elements can be mixed when fuel is required, and hybrid electric drives to reduce fuel consumption.

  - ⇨ Micro-ration packs.

- **USECT Framework**. USECT provides a useful framework for dealing with the complexity of urban operations.

- **Joint Doctrine**. There is a requirement for joint doctrine that includes military, government and civilian organisation coordination (in both the planning and execution of urban operations).

Houses of Ypres A.Y. Jackson

CONCLUSIONS AND FUTURE AREA OF STUDY

Conclusions

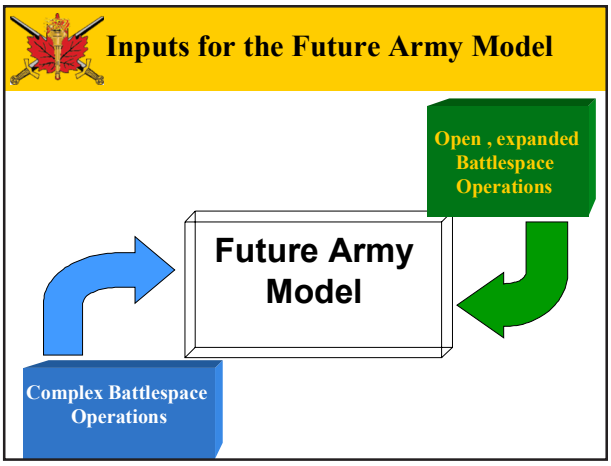
In determining whether a force optimized for open, expanded battlespace operations can be effective in operations in a complex, specifically urban, environment, it was found that the EXFORs could operate but with limited effectiveness. Even the technologically sophisticated EXFORs A and B, had significant shortfalls due to their composition and the characteristics of urban areas. EXFOR C encountered severe shortcomings due to a lack of technological advances and resources, particularly in the *Command*, S*ense* and A*ct* functions.

Operations in urban terrain will prove extremely difficult for any army, no matter how well it is equipped and organized, and no matter how advanced its doctrine and training may be. Although further analysis is required, URBAN CHALLENGE showed the value of numerous concepts to assist in preparing a military force for one of the most likely future operating environments—urban. Analysis points specifically to the need to understand complex environments better and develop requirements related to the five operational functions to achieve success.

Capability requirements, CEV/MMEV mix desires, and differences in the relative importance of long- and short-range assets already suggest that "*one size does not fit all*" when it comes to force structure. Optimizing a Future Army construct for complex terrain while making it adaptable to open terrain will require careful analysis.

Future Area of Study

URBAN CHALLENGE explored new concepts and technology that deepened our knowledge of requirements needed to fight and win in the urban battlespace. Findings and insights will be used to refine Future Army concept development and guide R&D initiatives.



Taken together, the first two DLSC experiments provide the background needed to further concept development on the Future Army Model. Operations in the open, expanded battlespace (Experiment 1) were characterized by deep battle and the value of extended range assets; operations in a complex battlespace (Experiment 2) featured close combat and the enduring value of individual soldiers. Balancing these capabilities and strengths, coupled with defining an inventory of related requirements to facilitate building the Army of Tomorrow, will be the next step in the challenge to create a force optimized for complex terrain and adaptable for the open battlespace.

Complex

- **Close combat**
- **Enduring value of the individual soldier**

Open, Expanded

- **Deep battle**
- **Extended range assets**

ANNEX A—LIST OF MAJOR QUESTIONS

Command

- Where should the commander be located during various phases of an urban operation? Does the urban environment restrict a commander's ability to use a "tactical Command Post"?
- What information or Commander's Critical Information Requirements (CCIRs) does the commander need to track during an urban operation? How will an "effects-based" control centre be different from a current HQ?
- How should commanders balance force protection issues in an urban environment?

Sense

- How are UAVs best employed in an urban environment? Should they be controlled at formation, BG and/or combat team level?
- How important are unattended ground sensors? Should they be allocated and controlled at formation, BG and/or combat team level? Can they replace standing patrols or observation posts?
- How should sensor feeds be fused? Who should have access to what information?

Act

- How can manoeuvre be used in urban areas? How can the concepts of controlling only nodes and critical points be best employed?
- How important are non-lethal weapons? At what level should they be held and controlled?
- How can collateral damage be minimized?
- What options are available to deal with the deficiency of "troops-to-task" in the urban environment?
- How can the moral and cyber planes be attacked at brigade level? How important are CIMIC and PSYOPS?

Shield

- How can EXFOR shield itself against attack on the physical, moral, cyber or electromagnetic planes?

Sustain

- How will lack of secure lines of communication impede replenishment and casualty evacuation operations?
- What alternate sustainment concepts might be of use in an urban environment?

ANNEX B—PARTICIPANTS

EXCON

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Mr D Saint	DSTL
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Maj B Chapman	AEC
Capt C MacPhail	AEC

COMMAND/STAFF APPOINTMENTS

Graduating students of CLFCSC Transitional Command and Staff Course 05

ANNEX C—OPFOR FACTIONS AND VIGNETTES

OPFOR Factions

The NATO Coalition was confronted with two principal groups of armed factions, both led by political parties championing diametrically opposed end-states for the troubled territory. Both ethnic groups, Bowls and Zacks, had the intent and capacity to conduct guerrilla actions, terrorist strikes and acts of defiance.

The ethnic Bowl group, supporting the political transition, comprised two elements: the Batumi Liberation Brigade and the more radical Batumi Freedom Fighters. Both factions, each numbering approximately 100 lightly armed guerrillas in the capital city, were routinely attacking the armed factions, citizens and institutions of the ethnic Zack people.

The ethnic Zack group, opposed to the transition, had a similar group of lightly armed guerrillas—the Zack Loyalist Forces, and a battalion-size force of loosely knit military deserters from a neighbouring country. The deserters were armed with a modest number of sophisticated tracked and wheeled armoured fighting vehicles, including anti-tank vehicles, air defence weaponry, tanks and a limited electronic warfare capability. A company-size element of Special Forces troops and several modern attack helicopters supported the deserter faction. Both ethnic Zack factions were conducting activities aimed at creating domestic instability, taking over government and security force roles, discrediting all who opposed them, and cleansing ethnic Bowl neighbourhoods.

Although the armed factions of each ethnic group were formidable, no armed faction in the Area of Operations (AO) had the weaponry or firepower to challenge openly the NATO Coalition. Nonetheless, all factions were able to draw considerable combat power from their ability to shield and conceal their actions by a variety of means to reduce NATO Coalition effectiveness and response options.

Vignette 1—Crisis Response

Vignette 1 introduced the deteriorating security situation within Batumigrad, as continuing violence by para-militaries and guerrilla forces reached crisis levels. A significant increase in ethnically motivated terror attacks throughout the disputed territory over a period of several weeks heightened tension, fuelled unrest, and prompted movement of internally displaced persons into Batumigrad. The assassination of the moderate Governor of Batumi, followed by the passing of a UNSCR authorizing NATO military action on behalf of the Security Council, led to deployment of Canada's EXFOR into two assembly areas north of Batumigrad and other NATO Coalition contingents elsewhere in the disputed territory. The challenge in Vignette 1 was to develop, within the overall campaign plan, a formation level concept of operations for the AO centred on Batumigrad.

Vignette 2—Defensive Operations

Vignette 2 opened with eruption of open fighting in Batumigrad and across the province. After a week of riots at Batumigrad University, a series of political assassinations heightened tension and led to all armed factions openly engaging in small skirmishes and terror attacks. A deliberate attack by armed ethnic Zack factions on NATO forces deployed in the capital resulted in a significant number of NATO casualties and fear of further attacks. The JTF commander ordered forces within the city to adopt a defensive posture and protect areas currently under their control while counter-moves were organized. Vignette 2 was set at BG level; the task was to develop and wargame a defensive concept of operations from unit to sub-unit level.

Vignette 3—Offensive Operations

Vignette 3 began with EXFOR located in two assembly areas outside Batumigrad, a city embroiled in open conflict. Seizure of the Provincial Legislative Building by Zack deserters in apparent collaboration with Zack Loyalist Forces led to ethnic Zack control of the city's downtown core and approaches, riots at the university main campus and the Provincial Legislative Buildings, erection of additional street barricades, mob action and violent reaction by Bowl guerrilla groups against ethnic Zack civilians and cultural sites. NATO was called upon to restore order in the capital and protect important civilian infrastructure, cultural, political and commercial sites; EXFOR was assigned the core of Batumigrad. The task in Vignette 3 was to develop and wargame an offensive concept of operations at both formation and unit level that would defeat armed factions and secure the capital.

ANNEX D—GLOSSARY

AAR	After Action Review
ADEV	Air Defence Effects Vehicle
AO	Area of Operations
BG	Battle Group
BGIFS	Battle Group Indirect Fire Support Vehicle
CBRV	Chemical, Biological and Radiological Vehicle
CCIR	Commander's Critical Information Requirements
CEV	Close Effects Vehicle
CIMIC	Civilian-Military Cooperation
CSEV	Combat Support Effects Vehicle
CSS	Combat Service Support
CV	Command Vehicle
CVV	Command Variant Vehicle
DFCC	Data Fusion Command Centre
ECC	Effects Coordination Cell
ERIFS	Extended Range Indirect Fire System
ERSTA	Electro-Optical Reconnaissance, Surveillance and Target Acquisition
EXCON	Exercise Control
EXFOR	Experimental Force
FAV	Future Armoured Vehicle
GENFOR	Generic Force
HICON	Higher Control
HIMARS	High Mobility Artillery Rocket System
HSSV	Health Service Support Vehicle
HUMINT	Human Intelligence
IO	Information Operations
IPB	Intelligence Preparation of the Battlefield
IR	Information Requirements
LAV	Light Armoured Vehicle
LV	Logistic Vehicle
MCF	Main Contingency Force
MIFS	Medium Indirect Fire System
MMEV	Multi-mission Effects Vehicle
NBC	Nuclear, Biological or Chemical
NGO	Non-Governmental Organisation
NLW	Non Lethal Weapons
OIO/DIO	Offensive / Defensive Information Operations
OPFOR	Opposing Force
OPP	Operation Planning Process
PIR	Priority Intelligence Requirements
PGM	Precision Guided Munitions
PSYOPS	Psychological Operations
SA	Situational Awareness
SV	Sense Vehicle
UAV	Unmanned Aerial Vehicle
UGS	Unattended Ground Sensors
UGV	Unmanned Ground Vehicle
UNSCR	United Nations Security Council Resolution
USECT	Understand, Shape, Engage, Consolidate and Transition
VSHORAD	Very Short Range Air Defence

PHOTO CREDITS

1. Reuters 11/12/2001 14:33:44
2. *Houston Chronicle*, Photo by Marcelo Salinas, Colombian rebel
3. Andy Frazer, "San Jose Skyline 2", Copyright 2000
4. www.spawar.navy.mil/robots/air/amgsss/mssmp.html
5. www.spawar.navy.mil/robots/air/amgsss/mssmp.html
6. Chris Brosinsky, Copyright 2000
7. Reuters 10/25/2000 16:58:42
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12. http://www.darpa.mil/tto/programs/fcs_oav.html, FCS OAV: Organic Air Vehicles
13. http://www.uavforum.com/library/photo/microstar.htm MicroStar BAE Systems
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17. www.spawar.navy.mil/robots/air/amgsss/mssmp.html
18. Military Application Study on alternatives to anti-personnel mines: 22 February 2002
19. ISC98-2130 DND photo, Drvar: 24 April 1998.
20. Defence R&D Centre
21. Defence R&D Centre
22. Defence R&D Centre
23. Natick Soldier Center
24. IHD01-1048a DND photo by Sgt V.M.W. Striemer, DGPA/J5PA Combat Camera, Tito Drvar, Bosnia-Herzegovina: May 3, 2001 Corporal Michael Skuce hands out "bon-bons" to local children while on foot patrol. Cpl Skuce is a Reservist from The Hastings and Prince Edward Regiment currently serving at Camp Drvar with O Company, The Royal Canadian Regiment.
25. ISD01-1009 DND photo by Sgt Gerry Pilote, DGPA/J5PA Combat Camera, Tomina, Bosnia: 09 November 2001
    Outside the defensive barbed-wire perimeter around the Canadian platoon house, Corporal Eric Charbonneau gives a Canadian flag pin to his new friend, local boy Samir Karabegovic.
26. ISD00-033-15A Photo by Cpl Marc Plante, Velika Kladusa: April 8, 2000
    Gunner from C Bty, 1 RCHA giving souvenirs to young citizens of Velika Kladusa.
27. ISD00-032-06A Photo by Cpl Marc Plante, Velika Kladusa: April 8, 2000
    Gunners from C Bty, 1 RCHA talking to a citizen of Velika Kladusa on election day.
28. ISD02-6016 Photo by Sgt Dennis J. Mah, DGPA/J5PA Combat Camera, 8 Wing Trenton, Ontario: January 25, 2002. The wife and children of a Canadian Forces aviation systems technician brace for his departure. Today, 180 Air Force and support personnel deployed to southwest Asia for Operation APOLLO, Canada's military contribution to the international campaign against terrorism.
29. DND Photo
30. DND Photo
31. DND Photo
32. DND Photo
33. DND Photo
34. DND Photo
35. APD02 5284 Photo by Cpl Lou Penney, 3 PPCLI Battle Group, Shah-i-Kot Valley, Afghanistan: April 1, 2002
    In the mountains east of Gardez, Corporal Dwane Russell of the 3rd Battalion, Princess Patricia's Canadian Light Infantry (3 PPCLI) Battle Group aims his weapon while helping to secure a landing zone for a helicopter bringing in Canadian soldiers to hunt for Taliban and al-Qaeda fighters. The 3 PPCLI Battle Group is deployed in Afghanistan on Operation APOLLO, Canada's military contribution to the international campaign against terrorism.
36. DND Photo
37. ISC98-2130 DND photo, Drvar: 24 April 1998
    Soldiers from the 1 RCR BG take up defensive positions to protect Bosnian Serbs during a riot by Bosnian Croats.
38. http://immc.redstone.army.mil/immcpublic/rd/olr/mlrs.gif Integrated Material Management Center
39. ILC85-96 Photo by Sgt Reid
    M109 self-propelled Howitzer in firing position.
40. http://www-acala1.ria.army.mil/LC/CS/Csa/rah66003.jpg Aircraft Armament and small Arms Commodity business unit
41. DND Photo
42. http://ctc.gagetown.mil.ca/infantry/gallery/photos/combat/approach/images/aprch003.jpg
43. DND Photo