

Directorate of Land Strategic Concepts

FUTURE ARMY EXPERIMENT

*Operations in the Expanded
Battlespace*



**Fort Frontenac
Kingston
June 2001**



Preface

The *Future Army Development Plan* of 08 March 1999 highlighted the need for wargaming experimentation to validate future army concepts. June of 2001 saw the first of these experiments. While much work remains to be done to analyze all of the findings, and even as a detailed report on the conduct of the experiment is being completed for issue in the near future, some early conclusions of interest to a wider audience merit publication now. The aim of this report is to disseminate to the Army at large the insights gained from the DLSC Experiment 01. It must be understood that it is still early in the experimentation process and these insights remain to be tested under other conditions.

The strategy and operations of any war can be understood only in the light of conditions of the ten or twenty years before its beginning. Technology, organization, doctrine, training, command and staff appointments—all the essentials of action in war—are put in place and developed in peacetime. The testing experience of combat will bring about change, but pre-war elements continue to affect many events throughout the longest of conflicts.

Peter Pareit



With Army Council approval, it was determined that this first experiment should look at operations in a general war scenario in the open, expanded battlespace, circa 2020, and should compare and contrast two different sets of capabilities. The timeframe of 2020 fits within the DLSC mandate of examining issues in the 11 to 25 year timeframe. The *Future Security Environment* (August 1999) and *Future Army Capability Requirements* (January 2001), coupled with the recent combat function audit on indirect fire, provided much of the background information.

Two experimental forces, EXFORs A and B, were examined. EXFOR A represented an evolutionary development of the Army while EXFOR B represented the acquisition of capabilities sufficiently advanced to facilitate a different concept of operations. In essence, the evolutionary EXFOR A model would continue the current trend of using firepower to support manoeuvre. For EXFOR B, enhanced extended range capabilities, coupled with a corresponding reduction in manoeuvre elements, demanded that manoeuvre support firepower.



The experiment was conducted in a seminar format of action, reaction, counter-reaction and discussion. To assist in the wargame deliberations, the work of the Army Experimentation Centre in developing appropriate simulation was used.

The results derived from this experiment represent but one small piece of a larger future force structuring process. Over the next year, DLSC will be conducting a similar experiment to explore high-end View 2 operations in the urban environment. Taken together, this series of experiments, later to include an examination of domestic operations, will provide the background for developing a model for the future Army.

DLSC/LFDTS
Fort Frontenac,
Kingston, Ontario
Aug 2001



Background

In order to increase the cogency of the findings, every effort was made to use validated data from previous experiments and analyses. Of particular value was the recent combat function audit on indirect fire assets.

A second source of import was the baseline data on weapons capabilities provided by the Army Experimentation Centre. This was especially important for those capabilities for which research and development is only just beginning. For example, one of the EXFOR vehicles was a Multi-Mission Effects Vehicle (MMEV), armed with a high energy missile (HeMi) postulated to reach speeds of mach 7 within 400 metres. Modelling was done using the current air-defence, anti-tank missile (ADATS) which is slower and bigger than the HeMi; however, the ability of the ADATS to kill T80 tanks at 5 km provided a minimal baseline from which results during the experiment could be projected.

Background Analyses

- **Cdn OR Studies & Army Experimentation**
 - Combat Function Audits 00/01
 - Army Experimentation Centre Modelling
- **Australian Headline (Bde) Experiments 99/00**
- **US Army:**
 - Army Transformation Wargame Series
 - Div Advanced Warfighting Experiment (DAWE)
 - Interim Strike Force (Bde) Experiments 99

Additional background information was drawn from related experiments conducted by the US and Australian Armies. Data from these experiments was consolidated to form a baseline picture representing the situational awareness that might be enjoyed and how it might be degraded over time. As well, data from these experiments was used as a start point to set the kill ratios and to determine the general effects of extended range capabilities.

Objectives of the Experiment

The objective of the experiment was to compare and contrast the capabilities of two different forces operating in an expanded battlespace. The focus was on answering two major questions: what are the significant multipliers and what are the major vulnerabilities? Utilizing two different force structures allowed a broader examination of both capabilities and vulnerabilities. The following list of subordinate questions was developed to address selected aspects of each of the operational functions.

Sense

- How should information for the force be managed, co-ordinated, and distributed?
- Will Sense capabilities be able to provide the assurance of targeting needed to exploit extremely long range weapons?

DLSC Experiment

Objective

To measure differences in capability between two experimental forces operating in the expanded battlespace circa 2020.

Method

Seminar wargame supported by OR/constructive modelling as appropriate. Incorporate Army Council insights, concept development methods, technology demonstrators and novel operational concepts.

Command

- What degree of confidence is required (or acceptable) by a force commander to identify and automatically attack mobile high payoff targets?
- What is the most appropriate command structure within and between headquarters to satisfy the time restrictions posed by attacking mobile high payoff targets?
- What are the potential command support functions that could be satisfied through a



reachback capability—at Battlegroup (BG)/ EXFOR level?

- How will a network centric capability affect mission command?

Act

- How much integral firepower does the force need and can the force receive timely and effective supporting fire through reachback?
- What are the possible implications of automatic sensor-shooter links and the implications for target acquisition, target assessment, munitions selection and morality?
- Do EXFOR A & B have the correct balance of firepower and manoeuvre resources to support their respective concepts of operation (CONOPS)? (i.e. firepower to support manoeuvre (EXFOR A) and manoeuvre to support firepower (EXFOR B).

Shield

- Does the increased lethality and mobility of EXFOR compensate for traditional passive protection? (i.e. will it be possible to achieve the protection afforded by a 70 ton vehicle in a 20 ton package?)
- What redundancy & protection does EXFOR require for its Information Systems?
- To what degree will EXFOR rely on deception for protection?

Sustain

- Will it be possible to configure a force for mission sufficiency, thus negating a regular/ linear re-supply system?
- Will mission sufficiency create a mobility problem?
- What is the best method for the care and evacuation of casualties?

Exercise Hypotheses

To be effective in the 2020 expanded battlespace, the Army will require new capabilities—defined as a combination of doctrine, structure and systems.

The experiment was designed to explore both new capabilities and what balance of capabilities would best enable the Army to fight and win in open terrain in an expanded battlespace. The central hypothesis was that to be successful EXFOR would have to achieve operational shock through manoeuvre, firepower and offensive information operations against the enemy in depth. This would include conducting high tempo, simultaneous, tactical manoeuvre of limited duration with the ability to rapidly aggregate effects from dispersed assets. In this regard, the following additional hypotheses were explored:

Hypothesis

The concept for operations in the expanded battlespace is predicated on the statement that EXFOR will achieve **operational shock** through manoeuvre, firepower and offensive IO against the adversary in depth. Hence the emphasis on conducting **high tempo, simultaneous, tactical manoeuvre** of limited duration with the ability to **rapidly aggregate effects from dispersed assets**.

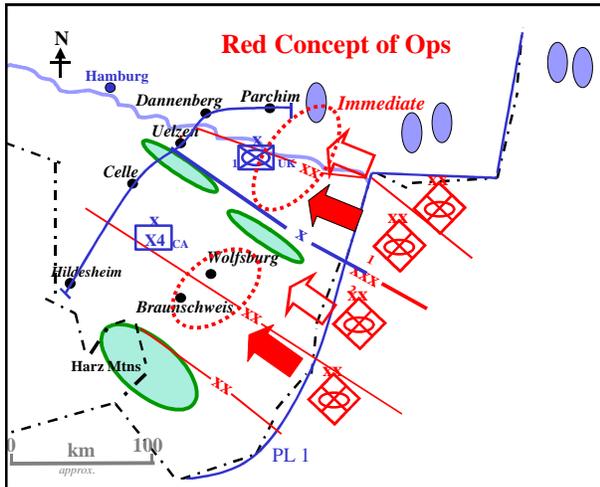
- burst engagements plus dispersion enhance force survivability;
- improvements to sense and extended range assets facilitate a decrease in close range forces;
- improvements to lethality allow close range forces to defeat much larger enemy forces;
- extended range forces gain in exploiting burst engagement tactics, dispersion, precision and lethality overmatch; and
- sense facilitates precision that in turn allows formations to engage and destroy enemy forces well above the currently accepted ratios of 3:1.



CONDUCT OF THE EXPERIMENT

Scenario and Red ConOps

The scenario involved fighting a conventional battle in open terrain, but within a greatly expanded battlespace and within unfavourable force ratio. The area of operations allocated to EXFOR A and B was comparable to that which would currently be allocated to a division or higher formation (150 X 200 kms). The size of the AO and the disadvantageous correlation of forces dictated that manoeuvre and firepower be carefully co-ordinated to achieve the ability to shape and defeat the enemy while retaining the combat capability for exploitation.



Both EXFOR A and B faced two divisions of RED forces, with four motor rifle regiments (MRR) in the first tactical echelon oriented on immediate objectives and two MRRs and two tank regiments in the second tactical echelon focussed on the subsequent objectives. RED possessed the full suite of modern conventional capabilities, being particularly strong in armoured forces and indirect fire assets. RED's attack helicopters were of high quality but limited in numbers. The correlation of forces lay significantly in RED's favour, with an advantage of 7:1 and 10:1 in manoeuvre against

EXFOR A and B respectively and 7:1 in firepower. The initiative for the initial attack lay with RED.



Representative RED Systems



Although numerically superior, RED was constrained by the relative backwardness of its intelligence, surveillance and target acquisition (ISTAR) system, which resulted in significant vulnerabilities. Most significant were comparatively deficient situational awareness and command and control systems. This resulted in vulnerability to BLUE reconnaissance and attack aviation capabilities. RED was also unable to fix BLUE forces and engage them in close battle, where RED's superior numbers would have been advantageous.

Blue (EXFOR) Forces

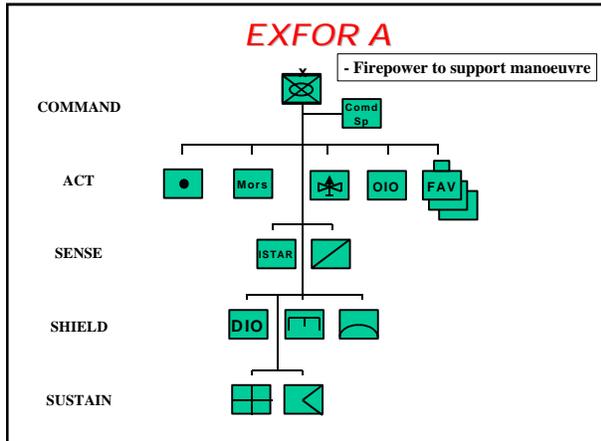
The two EXFORs were structured to provide capabilities across the five operational functions. Both EXFORs were relative in size to a current brigade group with a strength of about 5000 personnel. A summary of each operational function follows.

EXFOR A—Act

The Act capabilities assigned to EXFOR A comprised tube artillery, mortars, armed aviation, offensive operations capability and three Future Armoured Vehicle (FAV) battlegroups. For modelling purposes the tube artillery was based



on 155 mm with precision guided munitions (PGM) and a range of 40 km. The mortars were based on a 120 mm calibre mortar with PGM and a range of 15 km. Aviation resources were modelled on the Griffon helicopter with an electro-optical, reconnaissance, surveillance and target acquisition



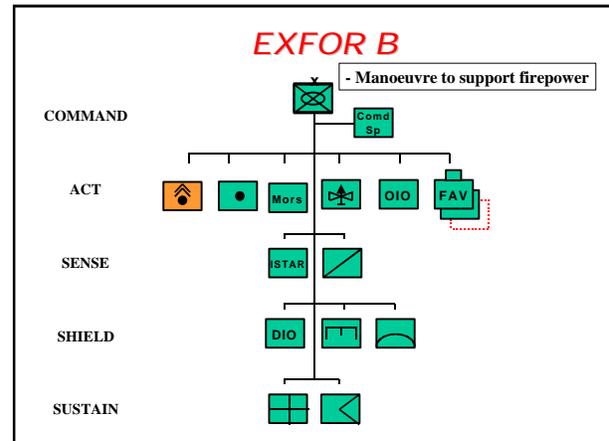
(ERSTA) suite and a weapons load of 8-16 Hellfire missiles with a range of 8 km and 38 laser guided CRV 7 rockets with a range of 7 km.

EXFOR B—Act

The primary difference between EXFOR A and B was the addition to EXFOR B of improved extended range assets. To supplement tube artillery and mortars, EXFOR B was given artillery rocket systems and attack aviation.

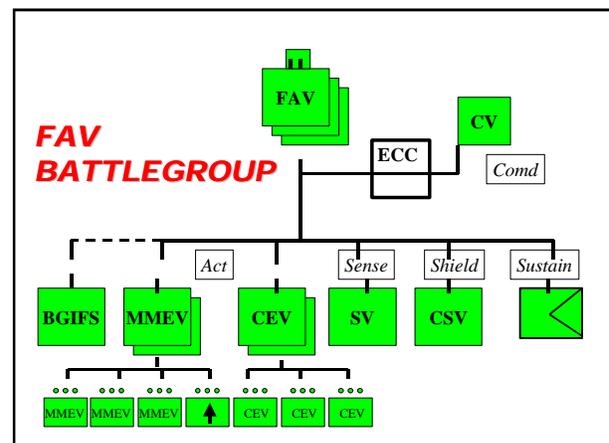


The rocket system was based on the US Army high mobility artillery rocket system (HIMARS); however, the range was extended to 100 km—a realistic expectation for 2020. The armed, ERSTA equipped Griffon helicopters were upgraded to the US Army RAH-66 Comanche. The stealth profile of the Comanche (radar cross section 1/30th of an Apache) combined with the ability to acquire, process and hand-off up to 200 targets gave EXFOR B a considerable extended range capability.



FAV Battlegroups

Close combat assets were organized into BGs, each of which contained capabilities across the five operational functions. In order to better explore the trade-off between close and extended range assets and their relationship to manoeuvre, EXFOR A was allocated three BGs and EXFOR B two.



Common Capabilities

In order to keep the number of variables to a manageable level, capabilities within the individual BGs, and across the other operational functions, were identical for EXFOR A and B.

The BG indirect fire assets were allocated from EXFOR. The main combat power of the BG was contained within the Multi-Mission Effects Vehicle (MMEV) and Close Effects Vehicle (CEV) sub-units. The MMEV sub-unit consisted of three sub-sub units of MMEV and one sub-sub unit equipped with a ground mounted missile based on Hellfire capabilities. The CEV sub-unit consisted of three sub-sub units. The MMEV represented the evolution of the current direct fire capability of the tank and the CEV represented the evolution of the LAV III. The CEV represented a conventional evolution of the LAV III, manned by a crew of three and carrying a section of six soldiers. Each CEV was armed with a 25 mm cannon and a general purpose machine gun (GPMG). Two vehicles per sub-sub unit were equipped with a Mk 19 automatic grenade launcher and one vehicle per sub-sub unit was equipped with a very short range air defence (VSHORAD) pod of four missiles.

The Multi-Mission Effects Vehicle

The MMEV was slightly more revolutionary in capability. In consultation with the research and development community, the



vehicle was modelled on the capabilities inherent in the FAV project. Armament consisted of a 105 mm electro-thermal-chemical gun with a basic load of 40 rounds and a pod mounted missile system for both anti-tank and VSHORAD tasks.

High Energy Missile (HeMi)

The MMEV missile was based on the current ADATS missile, but with improvements projected to occur in the next 10 or so years. It is expected that such a missile will be

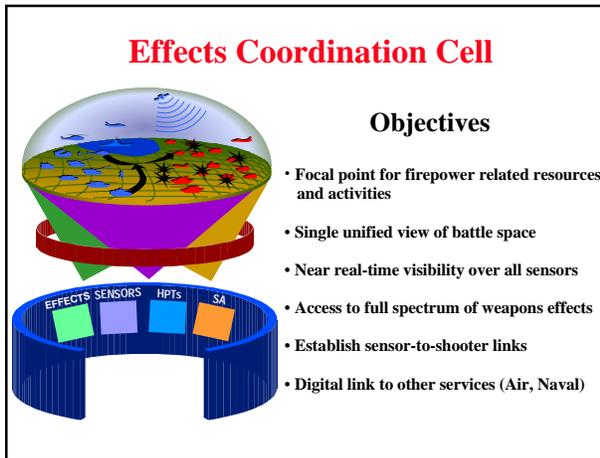


approximately one meter in length, weigh 20 kg and reach a speed of mach 7 within 400 m of launch. Given the speed of the missile, it is expected that it will be a laser beam rider.

Command—Effects Coordination Cell (ECC)

Command support was organized on the basis of a command support battalion, relying heavily on technology with knowledge as the driving feature. The routine collection, analysis and synthesis of data was considered to be automated. The headquarters of both EXFOR A and B comprised two “effects co-ordination” cells that provided redundancy and the capability to split planning and execution between the two cells.

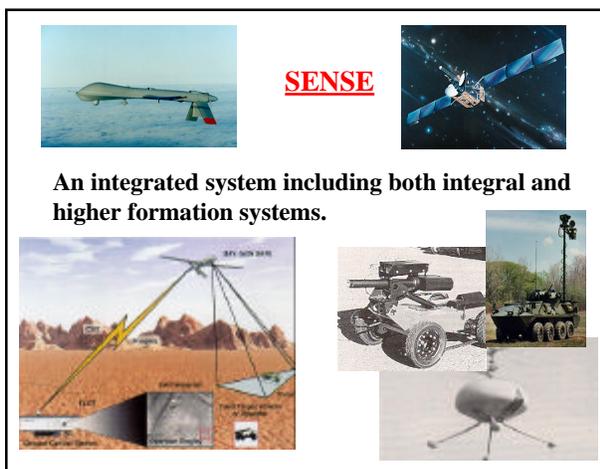




One of the more important projected capabilities was centralized control of weapon effects embodied in the concept of an ECC, linking sensors and effects providers. In order to do this effectively the ECC requires visibility over all potential sensors and attack resources, including joint assets, in order to maximize responsiveness.

The ECC was capable of establishing, altering and terminating direct sensor-to-effects links. Connectivity permitted a reduction in the layers of fire support and fire direction nodes. These functions and organizations were consolidated into fewer and more capable ECCs which were located at those levels that could plan, coordinate, prioritize, de-conflict and execute the fire support plan.

Sense



In order to make effective use of the capabilities inherent within each EXFOR, it was necessary to make some projections about the sensing systems that will be available circa 2015. In particular, it is expected that the sensing system will be an integrated one, enabling commanders at all levels to access information from a wide variety of sources—strategic to tactical. This capability was given to both EXFOR A and B. Degradation of this capability was not exercised.

The Sense features common to both EXFOR A and B included sensor links and computer systems immune to interruption and destruction. The sensor mix provided 24/7 coverage and through connectivity with resources from higher facilitated long-range target identification and engagement. The common operating picture (COP) was well developed out to a distance of 120 km.

Shield

There were no structural differences in the Shield capabilities assigned to EXFOR A and B. Field engineer, air defence and NBCD capabilities were available at both the EXFOR and BG level. Engineers were able to provide both mobility and counter mobility support; however, this aspect was not fully explored in this particular experiment. Regarding air defence, EXFOR established an umbrella to counter low to medium threats and the BGs handled very low level threats with the VSHORAD missile on the MMEV.

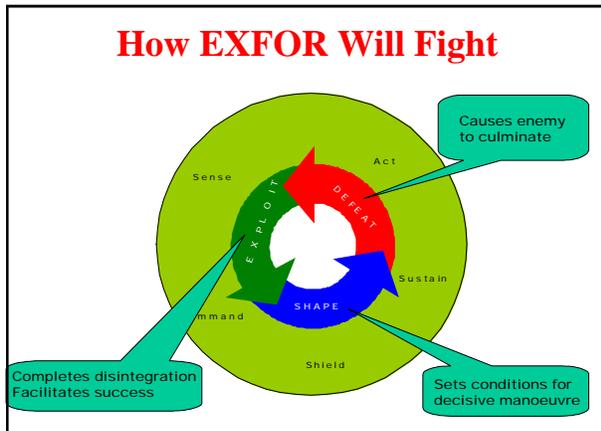
Sustain

Sustain capabilities for both EXFOR A and B were based on a modular approach wherein sub and sub-sub unit capabilities were added or deleted depending on the mission analysis. Replenishment was provided through a distribution based system emphasizing precision. Sufficient integral support was



provided to enable the completion of a range of potential missions with resupply on an emergency basis only. The medical support system concentrated on stabilization and evacuation. The size of the area of operation, in most cases, dictated the need for a dedicated air evacuation capability.

Blue Concepts of Operations



The operating concepts for both EXFOR A and B were based on a cyclical process of shaping, defeating and then exploiting. The way in which this was achieved differed based on the availability of extended range assets. In addition, the entire cycle was examined using a construct based on the operational functions of command, sense, act, shield and sustain.

EXFOR A ConOps

The concept of operations for EXFOR A was based on the tactics of “Find-Fix-Strike”. Find was based on the integration of higher and integral sense assets. Of note was the ability of the sense systems to identify enemy actions well beyond the ability of EXFOR A to take action with integral Act resources. Using this high degree of situational awareness, the enemy was fixed using medium range assets, and where possible, the extended range assets from coalition. The enemy was then defeated using traditional close combat tactics, but executed



only after significantly reducing the enemy’s combat power. Where possible, EXFOR A shaped the battle wherein the enemy was forced to break out, allowing EXFOR A to use the advantage of defensive power. EXFOR A sought security through dispersion. The manoeuvre elements were dispersed throughout the battlespace down to sub-sub unit level, with a high level of situational awareness. Each sub-unit contained the integral capabilities, both direct fire and VSHORAD, to facilitate the creation of a protective envelope within which any threats could be destroyed by integral firepower. Indirect assets were as well dispersed with the ability to mass effects provided through the ECC.

EXFOR B ConOps

The extended range assets of EXFOR B allowed it to employ a concept of operations best described as “Find-Kill-Finish”. As with EXFOR A, the find function was accomplished through the integration of both higher and integral sense assets. A high degree of situational awareness was achieved with a common operating picture at all levels. The advantage of EXFOR B lay in its ability to use extended range assets, specifically the Commanche helicopter and rocket systems, to kill at distance.





In the initial stages of the battle, the manoeuvre elements were used to provide security for the extended range assets. Security was further enhanced through the physical dispersion of assets and the use of the ECC to mass effects. EXFOR B used its long range assets to set favourable conditions for the close battle, which could best be described as “mopping up”. In fact, the 1st tactical echelon motor rifle regiment was so decimated through extended range fire that it was defeated without engaging in a close battle at all.

Judgements & Insights

As many analytical and assessment tools as possible were used in order to determine the greatest possible breadth of insights and judgements. The tools ranged from the mathematically based operational research analysis

Judgements and Insights

- The formation is a ‘system of systems’ which together achieve tactical synergies:
 - aviation and extended range firepower;
 - manoeuvre and firepower.
- EXFOR B was able to exploit extended range capabilities setting conditions for the close fight on Blue’s terms:
 - extended range **neutralized** Red reserves during ‘break-in’;
 - extended range facilitated **rapid penetration** of Red defences;
 - extended range denied Red the ability to close with and **decisively** engage Blue.

to collective, subjective insights based on professional opinion. The insights and judgements from this experiment must be combined with other scenarios in order to draw valid conclusions about desired force development. The computer modelling was based on using existing, or about to be fielded capabilities, with a margin of capability added for what might occur in the next few years.

EXFOR B was particularly successful in degrading RED’s capability during the break in battle. Extended range capabilities were used to attack RED reserves in their assembly area once the border was breached. Most importantly, extended range assets allowed EXFOR B to shape the conditions under which the close battle was eventually fought. This ability to shape essentially deprived RED of the ability to close with and decisively engage EXFOR B, with a concomitant reduction in Blue casualties.

Judgements and Insights

- Extremely good SA coupled with extended range capabilities allowed EXFOR B greater scope in composition of reserve.
- Situation awareness facilitated dispersion which enhanced survivability e.g. RED counterfire was generally ineffective.
- The ability to mass effects from dispersed locations was critical to success.

The Experiment modelled a high level of situational awareness which, when coupled with extended range assets, gave EXFOR B considerable latitude in both the composition and timing of establishing a reserve. This same SA facilitated dispersion down to the sub-sub unit level for manoeuvre forces and down to individual systems for indirect assets. This dispersion enhanced security and survivability through negating counter-fire while still allowing



the massing of effects through the ECC. Although the HiMARS were initially dispersed individually, it was determined through exercise play that resupply would be more effective if sited in pairs. Siting in pairs allowed the reload vehicles to establish a fairly good rate of turnaround.

The battlespace in which EXFOR A and B operated was far different from the current norm, in particular in terms of physical size and concentration of enemy forces. It was subjectively assessed that this dispersion could create feelings of isolation that could impact on cohesion, moral and trust. As the battlespace increases in size, training and education must prepare all ranks to use this dispersion to advantage. It was further opined that the size of the AO combined with the lack of friendly forces on the flanks, would place

Judgements and Insights

Sense

- Shared, scalable COP needed to accomplish command decision making (PIRs), precision targeting and BDA.
- High resolution sense assets are needed to accomplish extremely difficult extended range effects. Must have plug'n play capability.
- Highly vulnerable to deception.

additional stress on the command support system as well as on the commander. Situational awareness and a common operating picture would help to alleviate this situation; however, it was the opinion of the exercise participants that some degradation in SA was to be expected. While functional, this high level of awareness presented the opportunity for directive command, the impact of which requires further examination. The size of the AO and of the enemy forces created the need for synergy of effort both within the formation and with external sources. Battlespace management was problematic and relied very much on the maintenance of a common operating picture and understanding of the commander's intent at each level of command.

Judgements and Insights

Command

- Dispersion will impact on cohesion, morale and trust.
- "Human in Command" Issues (overload, fatigue).
- Network Centricity allows both Mission and Directive command.
- Battlespace management in a multi-dimensional battlespace will be a highly complex joint/combined activity.

Sense assets were essential to realize the potential of the extended range capabilities. High resolution was required and it was considered that given the complexity of the battlespace and targeting issues, it was essential that formation level resources have the capability to integrate with higher level.

It was further considered that the reliance on Sense creates a critical vulnerability. The system must be protected and must have built in redundancies. The vulnerability to deception must be carefully assessed and guarded against. The ability of EXFOR to "act" like a current division is based on the effective use of all its capabilities and any significant degradation of the sensing capability would cause a reassessment of the task.

Judgements and Insights

Act

- Balance of capabilities existed in both EXFORs, but EXFOR B suffered from a lack of soldiers who could dismount.
- Both EXFORs achieved success in shaping but only EXFOR B was able to exploit.

Shield

- Active protection, high mobility and dispersion are essential to success. Best defence = Good offence (AEC and DREV modelling).
- Information is Centre of Gravity. Information protection is key to enabling EXFOR concept. Redundancy of systems ensured continuity of COP.



EXFOR A and B contained different ratios of manoeuvre to firepower capabilities, with EXFOR A having one additional manoeuvre BG and EXFOR B have significantly more lethal extended range assets. This difference became pronounced when the mission changed and EXFOR was given an exploitation task. EXFOR A had suffered far more casualties than B and required some reconstitution; whereas the combat power of EXFOR B was essentially intact. At the same time, during discussion about engaging in tasks with a high manpower requirement, it was clear that EXFOR B would lack flexibility. The balance between firepower and manoeuvre must be carefully considered in force structure and must take into account the requirements of more than any one mission setting.

The experiment provided ample evidence of the need to integrate the capabilities inherent in each of the five operational functions. The vulnerabilities of EXFOR, in particular information, demand that the Shield function be given a high priority. The proliferation of sensing systems throughout the world gave rise to discussion about whether or not deception is still possible. It is clear that given the proliferation of information, the advantage will lie with the force that can process and act on this information in a timely fashion. Direct shooter to sensor links and autonomous burst engagements are two possibilities in this regard.

Sustainment issues were considered during the exercise and controls were placed on missile availability. A “mission sufficiency” approach meant a larger “tail” than normal; however, the trade off was a reduction in the requirement for secure lines of communication. During the experiment, it was determined that this would work for the majority of supplies; however the provision of artillery ammunition became problematic due to the quantities involved. Resupply based on “battle rhythm” was more achievable than was “mission sufficiency”. This dictated the establishment of temporary resupply corridors on

Judgements and Insights

Sustain

- Precision munitions, increased reliability and reduced demand make mission sufficiency an achievable concept.
- EXFOR could not operate fully without LOCs for specific weapon systems.
- Focus of casualty care on stabilization and evacuation. More capability required forward especially in the expanded battlespace.

an as required basis. The experiment did show that the use of precision munitions can reduce the quantity of munitions expended and thus reduce the resupply problem. For example, EXFOR B only expended 1000 missiles.

Medical support to a fast moving formation in an expanded battlespace was discussed. Although casualties were relatively low (approx 100 per day for a total of 400/450 total), it was clear that the effort in the future must be on stabilization and evacuation. The distances and possible lack of secure lines of communication will likely dictate dedicated air evacuation resources.

Questions Not Answered

Although the experiment provided the opportunity to examine issues related to operations in an open, expanded battlespace, there were a number of issues that could not be examined due to experimental limitations.

Questions Not Answered

- Moral vs physical effect
- Command through reachback
- Command and Control warfare
- Impact of deception
- Mobility support and counter-mobility



As the experimentation process matures, it is intended to examine these issues in both open and restricted terrain. The mobility support issue is of particular importance given the projection of being a wheeled force.

Recommendations

Although further analysis is required, this experiment clearly showed the value of extended range assets in an open, expanded battlespace. The HiMARS was very effective and in combination with mortars and tube artillery greatly increased the lethality of indirect fire. It is a system well worth further investigation.

Recommendations

- Extended range engagement capability
- ISTAR system
- Integrated digitized command system
- Armed Recce Hel
- Deception
- Ability to engage in close combat (kill/finish)

The integration of Sense systems was considered essential for EXFOR success and the ISTAR project should be pursued as part of this requirement. In view of the obvious need for synergy and a systems approach, an integrated digitized command system is essential to facilitate the required connectivity.

Armed helicopters provided both EXFORs with a considerable capability. The Comanche was particularly effective; however, the Griffon helicopter equipped with ERSTA, CRV 7 rockets and Hellfire missiles provided a formidable capability.

The experiment results serve to endorse the current alignment of 1 Wing and S&T force development. An evolutionary process is recommended, moving from ERSTA through armed ERSTA Griffon to a dedicated armed reconnaissance helicopter.

Recommendations

- Aviation:
 - ERSTA,
 - Armed ERSTA,
 - Future ARH.
- S&T focus areas:
 - Future US Army FCS-focussed R&D.
 - Align ISTAR TD to explore issues of sensors, sensor management and data fusion in the context of operations.
 - Continue exploration into lethality and communications areas.

Notwithstanding the proliferation of Sense systems, deception is still considered to be an important factor and work needs to be done in this area to determine what is possible, in particular in the electronic cloaking of forces.

Although EXFOR B was a formidable force at extended range, the close battle was still necessary. As well, there are tasks for which dismounted soldiers are required. A balance of manoeuvre and firepower assets is essential.

Future areas for S&T involvement are many and varied, but must include continued work with the US Army on their FCS; the alignment of ISTAR to meet operational requirements and continued research into lethality and communications, including information security.

Conclusion

The experiment provided valuable insights into the use of extended range indirect fire assets in open terrain. The expanded battlespace presents complex problems that can only be dealt with by balancing capabilities, in particular, manoeuvre and firepower. The results derived from this experiment represent but one small piece of a larger future force structuring process. In the near future, DLSC will be conducting a similar experiment to explore operations in the urban environment. This will be followed by an examination of domestic operations. Taken together, this series of experiments will provide the background for developing a model for future Army force development.



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