URBAN WARFARE – REDUCING CHAOS THROUGH IKC2
BY MAJ GARY CHAN

Introduction

The world is becoming more urbanised; by year 2050, about 70% of the world's population will live in cities[1]. Cities have traditionally been a concentration of wealth, a centre of the government and power – it is a symbol of civilization. In history, numerous wars were fought over control of cities so as to capture the centre of gravity over the territory it controls.

The challenges of fighting in urban environment may be attributed to the density of the people and the buildings. Sun Zi recognised the difficulties of fighting against a 'walled city' and not in favour of a direct attack against fortified defences[2]. The unique characteristics of an urban environment created numerous challenges as evident in past campaigns.

Throughout history, armies have tried to capture cities; most failed and those who succeeded paid a high price for it. In recent conflicts, the Chechens showed resolved in defending the city, the Russian suffered heavy loses before controlling the city; this was despite of their experiences in Afghanistan[3]. In the age of network centric warfare, fighting in urban environment will be supplemented with better command and control, timely fires and better force mobility to achieve protection. This essay takes a scientific approach to understanding the dynamics of fighting in an urban environment, using the

[1] *A Guide to Global Environment*, World Resources 1998.
[2] Wee Chou Hou,*Sun Zi Art of War*, Prentice Hall, 2003, pp 61
[3] Sean J.A. Edwards, *MARS Unmasked*, RAND Arroyo Centre publication, 2000, pp31

Chaos theory to propose a possible operating concept and how the SAF may use the Integrated Knowledge-based Command and Control (IKC2) as a possible tool to meet this challenge. In addition, it will also highlight, as part of the overall strategy to reduce uncertainty on our side, the key technology enablers and the leadership competencies required for the soldiers fighting in such an environment.

Challenges of Urban Warfare[4]

The urban operation is inherently complex due to density; the density of the city's physical construction, density of the surrounding infrastructure and the density of the population. The interactions of these three factors characterise a build-up area.

The urban canyon is carved out of buildings, constructed in densely packed fashion, which may not be arranged in logical manner. The three dimensional nature of a city offers different avenues of approach within the city. At the super surface level, movement via aircraft and helicopters are vulnerable as approach to build-up areas tend to be slow and SHORAD systems are able to engage such crafts. At the surface level, the compartmentalized nature of building forces soldiers to operate in small groups, away from the comfort of higher HQs. Command and control will be poor without superior communications and soldiers will need to be more agile to operate in such environment. Often the blueprint of the city and accurate enemy disposition are difficult to ascertain making detailed planning difficult. On the streets, movement within the build-up area is

[4] Rob Engen, *Military Operations in Urban Terrain: Ramification for Canadian Defence Policy,* presented at the 6th Annual CDAI Graduate Symposium, Kingston, Ontario, 23 Oct 2003.

restrictive, limited to streets and narrow alleys. Tanks and armoured vehicles are particularly vulnerable; the short engagement distance reduces the effectiveness of their armaments while crude short-range anti-tank weapons e.g. rocket propel grenades (RPG) are effective against a sophisticated armoured vehicle. As a consequent, light forces operating in the BUA have little protection and susceptible to enemy ambushes. The use of long-range indirect fires e.g. mortars, often creates collateral damages. With the 'CNN effect', such damages may result in catastrophic political effects on the attacker. At the sub-surface level, sewers, drainage and underground transport systems allow for the defender to use them as 'safe havens', thus making it difficult for our forces to destroy them. Evidently, **huge amount of resources will be required for such operations, yet the risk of collateral damages and own casualties are high**.

The civilian non-combatants are a concern to military manoeuvres. They will be present within the city and may interfere with the manoeuvres. On one extreme, the population may be considered friendly; they support the attacker and will provide assistance. On the other hand, the population may be hostile to the attacker and put up a strong resistance in the form of insurgency resulting in an arduous task in gaining control of the city. Wining the hearts and mind of the people will become an integral part of military operations in urban areas in future.

As shown in Operation Iraqi Freedom, operations in BUA will always result in disruption in essential services including food supplies. There may be a breakdown in law & order and the transport networks. There will be urgency to restore such services and

infrastructure to support the population. The military has limited engineering means and will have to depend on the civilian contractors and NGOs to oversee such operations. A greater challenge is for the military to work and co-operate with the local population while trying to communicated with them and be mindful of their culture.

Chaos Theory in Urban Warfare[5]

The Chaos Theory is based on the observation that certain **events do not follow a linear pattern**. An example is the stock market. The volatility is a result of the interaction of many factors such as social, political and economics. Thus a past event happening does not indicate the same outcome. The Chaos Theory also noted that a small event occurring at one place may create a huge response in another place through a series of related events that cannot be described mathematically. Such is the complexity and uncertainty of the world. Similarly, fighting in urban environment is **non-linear** and does not seem to follow rules of past campaigns. It is chaotic and the side with superior combat power may not emerge the winner; every operation within a build-up area brings about dissimilar outcome even with similar fighting doctrine.

Chaos model of a city

Let's assume that the centre of gravity of a city is at the core. The core is often the most heavily protected place and in-terms of chaos, the most stable i.e. the least entropy[6]. Hence, the city core has the lowest entropy while the outer most defence of the city is the

[5] Colin S. Gray, *Strategy For Chaos: Revolutions in Military Affairs and the Evidence of History,* London and Portland, Oregon: Frank Cass, 2002, pp90-110

most sensitive to a change in the external environment; a small stimulus will cause a greater entropy change on the outside as compare to the core. (See Fig 1) The war in Chechnya has showed that an attack on a build-up area from the outskirt will result in strong resistance from the defender, resulting in a mess of small unit fighting without clear outcomes.

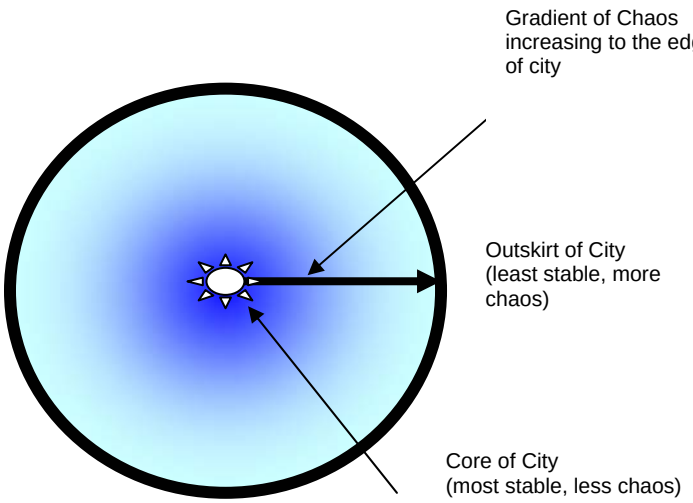

Figure 1. A simplistic Chaos model of a city. The outskirt is in a more chaotic state as it is under constant pressure to maintain the defence of the city. In comparison, the core of the city is in a less chaotic state being the best protected and under less external pressure.

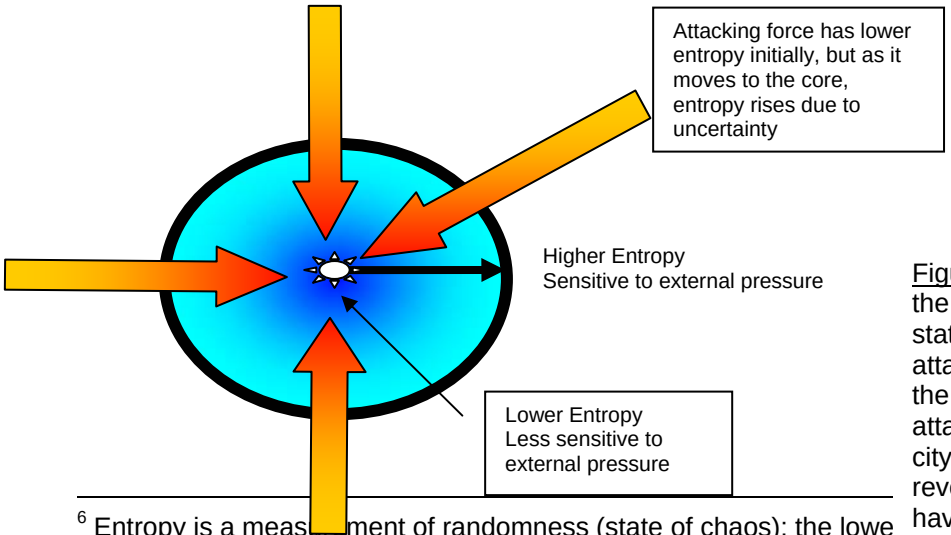

Figure 2. In traditional conflict, the defender is constantly in a state of higher entropy as the attacker has the initiative on the outskirt. However as the attacker moves closer to the city core, the entropy is reversed with the defender having a better edge.

[6] Entropy is a measurement of randomness (state of chaos); the lowe

As the attacking force moves closer to the core, they will experience higher entropy due to greater uncertainty and risk within the BUA. (See Fig 2) On the other hand, the defender maintains the initiative and may continue to harass and disrupt the attacker thereby raising the latter's entropy to a state of dysfunction. At this stage, the combat capability of the defender is relatively well preserved and have the advantage of the ground to further inflict damages to the attacker, through surprise attacks and ambushes, causing the latter to be disorientated resulting in defeat. This was documented in the Chechnya war of 94/95 when the 131st Maikop Brigade tried to capture Grozny and was attrited[7].

It is evident then that the side with better capability to manage the entropy will likely have a better chance of success. Is it possible to maximise chaos on the side of the opponent while minimise our own? Many literatures have suggested that the key is the use of operational art. However, in the information age, operational art may become more of a science with the advent of network centric warfare.

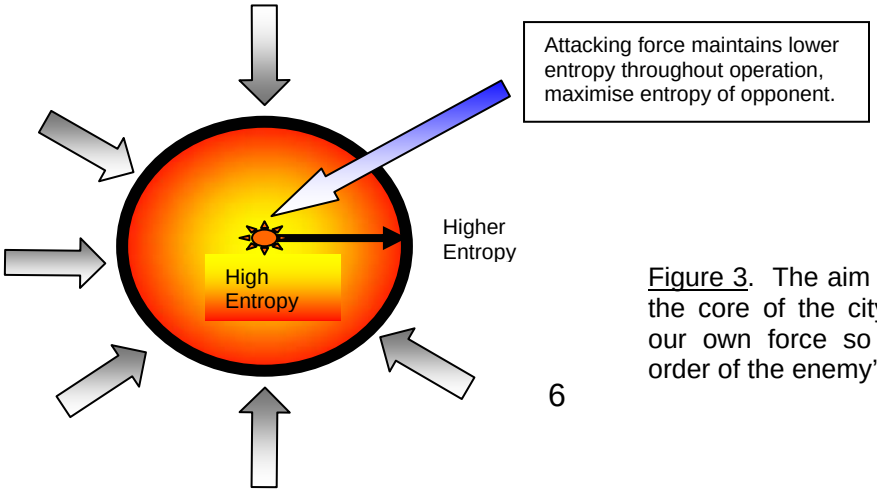

Figure 3. The aim is to introduce Chaos into the core of the city yet maintain stability in our own force so as to upset the natural order of the enemy's defence.

IKC2[8] – an enabler to reduce Chaos

IKC2 aims to create a framework to facilitate effective battlefield connectivity between the sensors and shooters through superior decision-making and battlefield management so as to address the challenges of a fluid and non-linear battlefield. IKC2 aims to drive the OODA loop faster throwing the enemy's decision cycle off-balanced and in so doing, resulting in his actions becoming ineffective or inappropriate[9]. It is able to do this though better ability to **observe** the enemy within the BUA to facilitate rapid **orientation** of our forces to the dynamic situation. This will allow greater understanding of the battlefield, thus able to **decide** on the logical course of action in a faster time and **act** in a decisive manner. In accordance with the OODA principle, IKC2 seeks to achieve **pervasive battlefield awareness**, **superior battlefield understanding**, **knowledge-enabled decision superiority** and **dominant battlefield management**.

In achieving pervasive battlefield awareness, sensors will be used extensively. The challenge is to be able to collect the essential information in real time yet deny the enemy

[7] According to Timonthy L. Thomas, *The 31 Dec 94 – 8 Feb 95 Battle for Grozny*, the Russian lost 102 out of the 120 APC, 20 of the 26 tanks and 6 surface-to-air systems and 75 servicemen.
[8] Jacqueline Lee *et al*.,*Realising Integrated Knowledge-based Command and Control*, Pointer Monograph No. 2, 2003.
[9] Edward Smith, *Effects Based Operations*, *CCRP Publication Series 2002*, pp 79 –90.

the ability to forecast our moves. This may be achieved through a series of sensors exploiting the space platform e.g. satellites, to provide continuous coverage of the BUA. In addition, HUMINT agencies must still provide the population sensing besides collecting target information within a dynamic area. This information will flow within the BUA at broadband speeds via routers allowing for interested user to pick them up. In this way, the SAF will not only will be able to **observe more** from stand-off and close-in positions but also post these information on the tactical internet for greater situational awareness[10].

With volumes of information flowing in from the sensors, there must be capacity to discern what is required. Computers distributed throughout the city via strategically planted nodes will be able to carry out real time processing by passing appropriate information via the network. The computers through its pre-defined algorithm will be able to piece together related information and create better understanding of the battlefield situation. In this way, the ground unit need not wait for the intelligence officer to make assessment, instead, the unit on the ground will be able to access accurate information, such as updated intelligence, at every corner of the BUA, thus improving the ability to **orient** to the changing situation[11].

Information processed by the battlefield computers will not be useful to the ground units if no course of action is associated with it. With numerous combinations of options to take within a BUA, it is beyond the human ability to process them in such a short period

[10] National Technical Unformation Service, *Future Command and Control on the move for the Objective Force*, Army War College, Carlisle Barracks, PA, 07 Apr 2003, pp2.

of time. Knowledge-based computer using neural networking[12] and genetic algorithm will be able to simulate the next course of action, with intelligence update from the battlefield[13]. This will allow the commander to **decide** in a short time on his next move yet cognizant of the developments and considering other humanitarian aspects of the situation. The commander will be able to better predict his outcome and more certain of victory in every fight.

Once the order to act has been given, the combat forces will be employed to achieve the required effects through the combined use of rapid manoeuvre and precision fire. To achieve this, the joint forces throughout the battlefield will be able to synchronise their movement in the BUA so as to destroy the enemy at the right time and place without rigid control from higher HQ. The action of our forces at the right moment within the enemy's decision cycle will force the enemy to abandon his current process and re-assess the situation, stalling his fighting tempo.

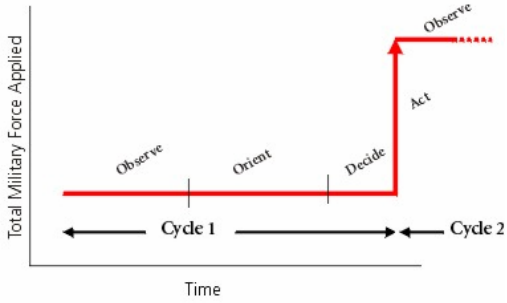

Figure 4. The 4 phases of the OODA Loop

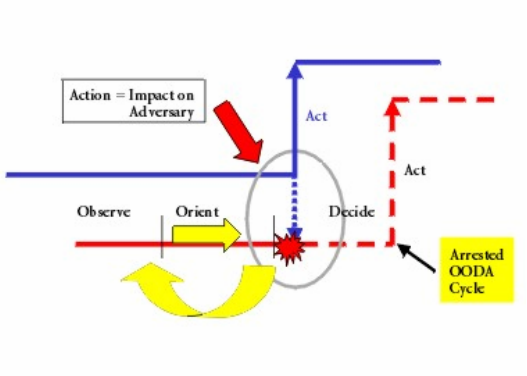

Figure 5. Taking the action at the right time forces the enemy to revisit his OODA loop, thus arrest his current decision-making.

[11] Timonthy Garden, *The Technology Trap*, Brassey's D

[12] George Leopold, *US Military deploys neural network technology*, EE Times, 17.07.2001, http://www.eetimes.com/story/technology/OEG20010717S0036

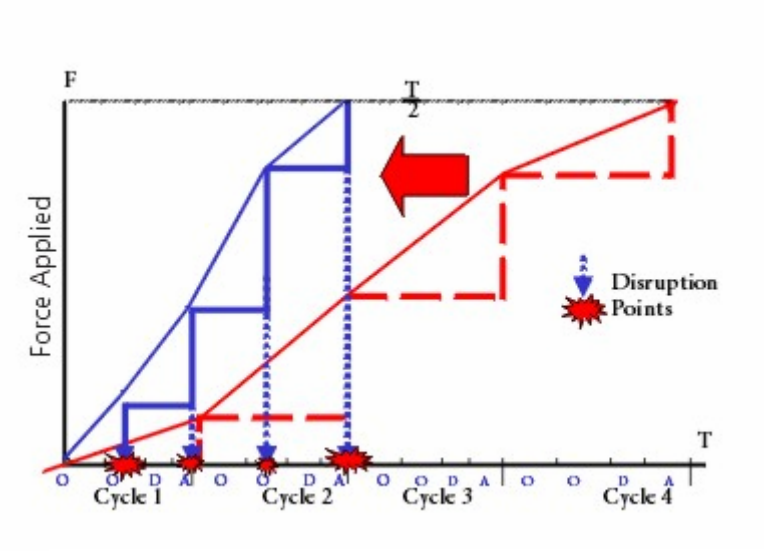

Figure 6. By a series of disruption points on the enemy's decision cycle, the tempo of the battle increases till the enemy has no control over his OODA loop, resulting in a lost of Command and control of his forces.

(Fig 4, 5 and 6 adapted from *NETWORK-CENTRIC WARFARE- **What's the Point?*** by Edward A. Smith Jr.)

The ability to 'out cycle' the enemy continually will force their decisions to become inappropriate resulting in complete lost of command and control, dislocating their ability to continue the fight. IKC2 may be considered as a robust battlefield framework to deal with battlefield complexities, while having the capability to inflict maximal chaos to the enemy. IKC2 then, will be the technology driver in the development of new urban fighting doctrine and force structuring so as to better manage and manipulate Chaos to achieve a battlefield advantage for our forces.

Urban Fighting Doctrine – Managing Chaos via SWARM[14]

The new BUA fighting concept may be one of **seek-destroy-clear** as compared to the traditional concept of **sense-breach-assault**[15]. In the Chaos model of a city, the centre of

gravity or the core is the most stable while the peripheral area being the least stable due to the direct contact with the external environment. Hence, in the **seek-destroy-clear** concept, the intent is to penetrate to the core quickly and cause maximal disruption such that gradient of chaos is reversed. This is like an inflated balloon. The outer surface has the most entropy because of the constant need to maintain the shape of the balloon while the centre has the least entropy. The gap to the core is via the neck of the balloon, hence when a source of chaos e.g. heat is introduced into the balloon core, the air in it is heated up causing the rising of entropy towards the surface. The result is that the balloon will expand till it burst. **This is the main idea of this fighting concept.** In the traditional concept, external force is applied from the outside, increasing the pressure till the balloon burst. In this case, the external force will need overwhelming resources i.e. manpower and firepower, to be able to capture the BUA.

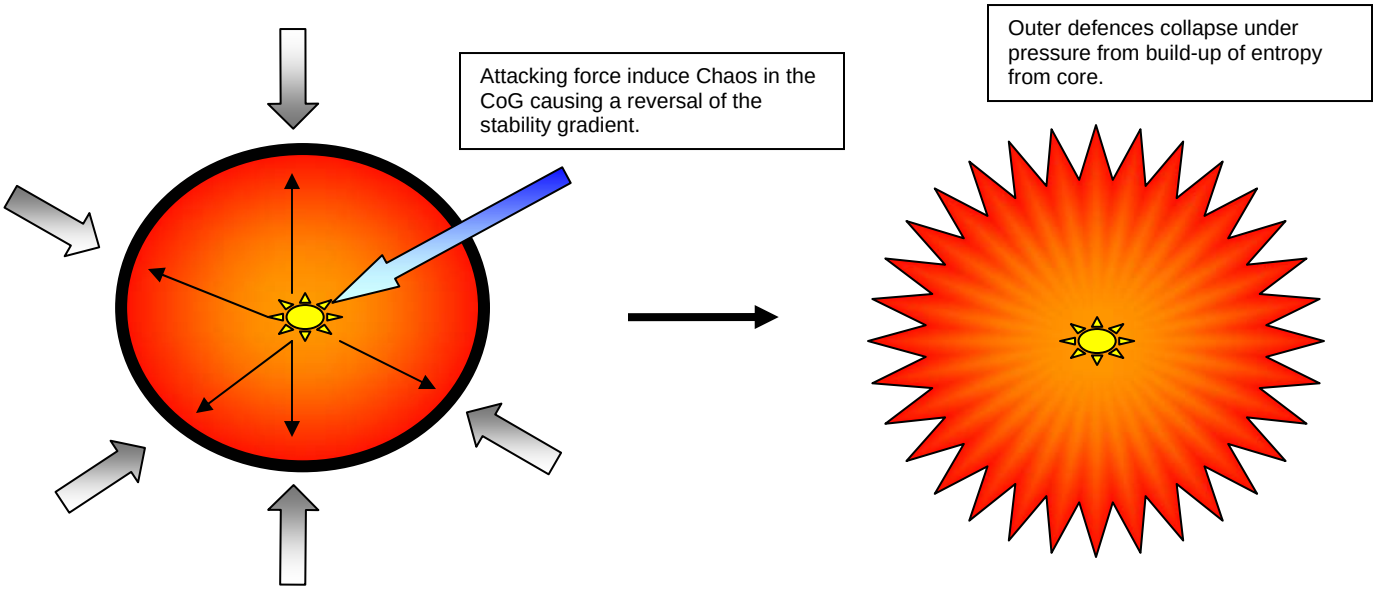

Figure 8. By introducing a source of Chaos in the CoG of the city destabilise the enemy's frontal defence through internal pressure. Coupled with the constant probe by the Swarming Force, the defence of the city would eventually breakdown like a burst balloon.

[14] John Arquilla *et. al.*, *SWARMING and the future of conflict,* RAND, National Defense Research Institute, Chap 4.
[15] LTC Lou DiMarco, *Attacking the Heart and Guts: Urban Operations Through the Ages*, U.S. Army publication, pp 21.

SWARM describes a technique of overwhelming the enemy through a deliberately structured, co-ordinated strike from all directions through means of sustainable **pulsing force** combined with close-in and stand off fires[16]. IKC2 supports this fighting concept by providing the connectivity between the Swarming Forces and sensors dispersed within the battlefield. The Swarming Force aims to detect a weakness in the defence. Using superior sensor systems on land and air platforms, forces will be able to swarm the defences to blueprint the enemy deployment. Information on the defence layout will be transmitted from various units around the BUA to fuse into a common picture employing ubiquitous computing[17]. Once a weakness in the respective sector of the defence is determined, the Swarming Force will enter the BUA to secure a foothold while fires continue to fix the enemy at the periphery. Once the gap is formed, a dedicated assault force will swarm towards that vulnerability and exploit the gap for penetration to the depth.

The assault force once penetrated the initial defence will move rapidly to the centre of gravity of the city e.g. government house, to capture it. This will create a **temporal dislocation** on the defender, besides gaining a positional advantage.

[16] Ibid, pp8-9.
[17] Ubiquitous computing refers to a web of computers in the battlefield which the tactical unit can utilise to process information. This reduces the need for the tactical unit to carry large amount of computing power.

While the centre of gravity is being captured, the enemy's defence at the peripheral of the city will be threaten from the inside, in addition to the front. The Swarm Force will continue to probe the city's forward defence through pulsating attacks. This will identify and create more gaps for other forces to penetrate the city to capture other key infrastructure such as power stations, water works and communication centres.

Once the key installations are captured and a secured avenue to enter the city centre is established, the enemy's main defence will be attacked from unexpected directions from **within** the city**.** Though the defender has the advantage of ground, the attacker would now have turned the tables and achieved **positional and functional dislocation** by approaching from within the city core, negating the main killing areas, entrapping the defender instead.

The benefit of using the **seek-destroy-clear** concept allows the BUA to be captured with relative ease by creating chaos at the Centre of Gravity, thereby radiating it to the surface across the grain of resistance. In contrast, the **sense-breach-assault** concept would have created chaos at the edge of the city and fighting along the grain of the enemy's defence.

The success of this concept is based on the fundamental principle of having large number of small manoeuvrable units, each easily configured for specific functions, networked with each other to share intelligence and mutual fire support so as to reduce our battlefield uncertainty yet inducing more complexity in the opponents decision making process.

Urban Force Structure

Traditionally, large divisional forces were used to fight urban battles. A good example was the Russian war in Chechnya. The Russian divisions were committed *en masse* to capture the city employing the **sense-breach-assault** concept using mainly armoured forces. Though there were numerous tactics to capture the presidential ground early, these were futile due to enemy ambushes despite timely intelligence. It is imperative that the task force used in the capture of a city be joint in nature employing air, naval and land assets where possible. (See Fig 9) An example of the task force organization may be organised into strike units comprising of precision missiles, aircraft and naval gunfire. There will also be reconnaissance and sensor units controlling UAVs, unattended ground sensors and HUMINT agencies to collect intelligence. Combat Service Support units supported by helicopters will also augment the task force, besides the NGOs and contractors. The bulk of the task force will be the Urban Unit of Actions (UAA) of up to brigade size force. The operation is co-ordinated by the Joint Task Force HQ. **This essay will focus on the Urban Unit of Action.**

The UUA comprises a number of specialised task forces that may be further sub-divided into assault platoons comprising manoeuvre, fire or sensor teams. The UUA is based on the concept of 'plug and play' that revolves around fielding the right force for the right purpose without compromising the fighting esprit of the unit. Depending on the size of the city, a number of UUA may be networked and work together. Hence, a typical UUA

comprises a number of Swarm Forces, CoG Force, Key Installations (KINs) Force, Clearing Force and Destruction Force. Within each of these type of forces, the composition differ depending on which functional section is required e.g. the Swarm Force will be sensor biased while the Assault Force would be firepower heavy.

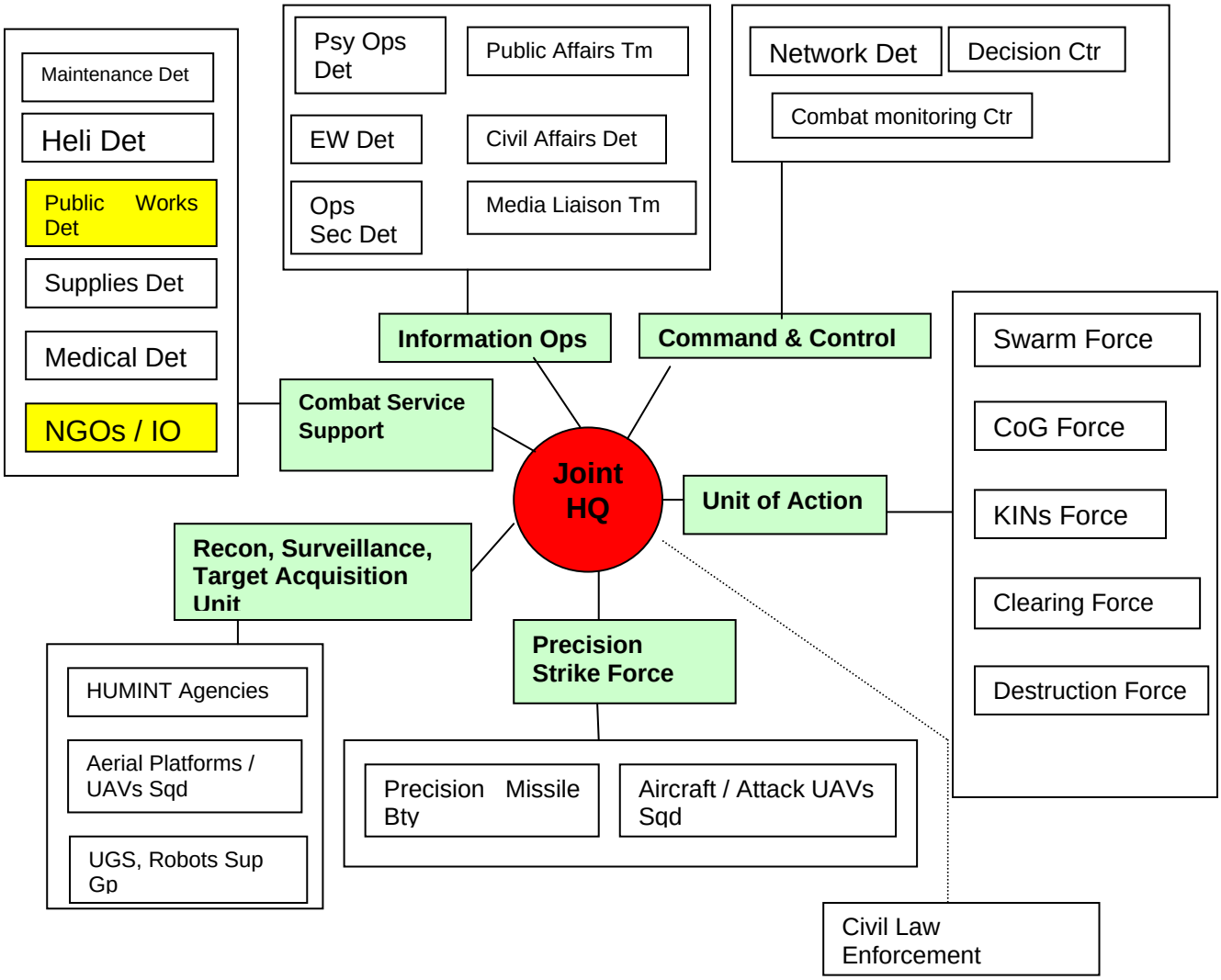

Figure 9. A schematic of an Urban Joint Task Force proposed by the author

Swarming Force.

The SWARM theory proposes that forces need to be light and mobile in face with situation of high uncertainty. The main task of the swarming force is to seek for the best avenue of approach so as to passage the CoG force to capture the Centre of Gravity of the city. Prior to the operation, the intelligence assets[18] operating within the BUA and sensors would have picked up the required information for the safe entry into the BUA. The platoon HQ with an intelligence team acting as a communication node would have pumped out all necessary information to the section. The platoon force would have to operate under the cover of darkness on dismounted role by infiltrating into the city and linking up with other HUMINT agency at pre-planned location. The assault section commander is able to make use of his decision support tools with updated intelligence to seek out known initial resistance by their stealth and speed. With simultaneous attacks on multiple points throughout the city frontal layout in the first wave, the enemy will be forced to re-organise and attempt to seek out the intruders. However, this now becomes a challenge for the defender, as co-ordinated fire from the high mobility vehicle will be targeting known strong points and attempt to break the frontal positions. Hence, the enemy is at a dilemma of whether to withdraw or maintain their prepared position; to withdraw the defender would likely to expose themselves targeted by the attacker's sniper teams yet to remain would result in imminent destruction by the second wave of attacks. However, if they choose to hide, the clearing force will eventually seek the enemy out.

CoG Force

[18] These include unattended ground sensors, aerial surveillance and HUMINT.

Once the gap within the frontal defence has been created, the CoG Force will rapidly rush in to capture the key buildings within the city. Once captured, defence around the key building will be established at critical positions. The platoons will comprise snipers and have automatic grenade launchers, bunker busting munitions, medium and heavy machine guns to supplement the firepower. This force will need to deter any enemy force trying to regain control of the key building[19]. The capture of the key building in the city should create a temporal dislocation to the enemy defending the frontal position such that they will be sandwiched and in a dilemma as to how to fight the attacker. The defender is now faced with greater uncertainty than the attacker.

KINs Force

While the CoG Force captures the key buildings, the KINs Force will exploit other gaps created by the Swarming Force to secure Key Installations so as to minimise disruption to essential services. This force will likely be firepower heavy with a mixed of light mobile platform and motorised armoured platforms. The break-in force to the KINs will likely comprise light forces on high-mobility vehicles to seize the control centres within the KINs. The heavier force will augment the light force and establish perimeter defence at strategic locations to counter enemy counter-attacks.

Clearing Force

While the CoG Force and KINs Force have secured their objectives, the Clearing Force on motorised armoured platform will exploit their way to the city centre using secured

[19] It was observed in Chechnya, the Chechens utilised the sub-surface to infiltrate back to the rear of the Russian to regain control of lost territory.

roads. This is to concentrate enough firepower to ensure the enemy will no longer be able to fall back to the depth. Instead they will have to fight from their back; a task they have not prepared for. The battle for control of the city begins from the centre while the Swarm Force continues to harass the defender from the outside. As the Clearing Force clears the resistance from unexpected directions through the buildings, the enemy will be thrown into chaos resulting in psychological defeat.

Destruction Force

In the overall strategy to capture a city, a means of escape for the enemy must be created so that the enemy does not fight on 'death ground' as suggested by Sun Zi[20]. The avenue of escape is often created in the area of heaviest resistance. The defender when faced with strong pressure in that sector from the rear will move out of the city and seek to re-group. The destruction force will be like a hawk, observing the prey and strike at the right moment. This force will be equipped with sensors and precision weapons to detect the enemy light forces and subsequently ambush the soldiers as they leave their defence positions[21].

Key Technology Enabler[22]

IKC2 will transform the way the Urban Force operates in the BUA by networking the sensors to the shooters throughout the battlefield. These emerging technologies aim to

[20] Op. Cit., Wee Chou Hou, pp367
[21] David Weatherley, *Smart Weapons Systems Concept*, Military Technology, 2/2002, pp42-51
[22] Technologies expected to mature in the next 5-10 years

integrate adjacent shooters so that mass effect maybe brought to bear on the same target even though the force may be dispersed.

Comprehensive Awareness

The success of most urban battles relies heavily on which side is able to observe better. Laser radar is a promising field whereby the urban terrain maybe mapped accurately. The fast scanning rate of the laser creates a picture that when analysed will be able to detect prepared positions[23]. Use of thermal image and image intensifier will continue to facilitate better detection[24]. See through wall sensors making use of radar technology are useful in detecting enemy behind walls[25]. This technology will be improved to sense for stationary soldiers.

Information Technology

To support a fast tempo in battle, the fighting units must have the latest update as quickly as possible. Currently, combat units pull information from the HQ, which has the ability to process the information from reconnaissance assets. However, ubiquitous computing will be needed; many computers within the battlefield serve a combat unit. Computers within the battlefield will be able to pull relevant information from other computers within the battlefield, process it and presents it to the combat unit that needs it. Thus, combat unit does not need to carry large processing power on the move. As long as it is within communication range of a node, the unit will be able to access the information.

[23] Op. Cit., Timonthy Garden, pp49
[24] Glenn W. Goodman Jr., *Night-Fighting Edge*, Armed Forces Journal, Dec 2002, pp32-34

Image fusion is another technology that will allow for the integration of data from various sensors to piece together a complete picture of the urban area. Information picked up by the unattended ground sensors, UAVs and HUMINT agencies maybe fused to give the Units of Action an accurate picture of the build-up area and the enemy positions. With increasing processing power and speedier processing, such knowledge may be presented almost instantaneously to the combat units within the capacity of the bandwidth.

Virtual reality will be used frequently in the battlefield. The soldiers will be able to interact with his commanders. Virtual digital sand table will give the soldiers a good mental picture of the building even as he enters the BUA.

Communication[26]

Operating in BUA is limited by line-of-sight besides the problem of multi-path that causes distortion to the signal. Ultra-wide band radio will be able to provide better communication signals. Software radios will provide flexibility for the 'plug and play' force besides inter-service communication.

Firepower

To minimise collateral damages in BUA, precision strike weapons will need to be employed. Non-line of sight missiles that can be launched from armoured motorised platforms will be useful to neutralise known enemy prepared positions from the onset

[25] Time Domain Product Brochure RDR-0068-RO, RV2000 Radar
[26] Sean J.A. Edwards, *Freeing mercury's Wings*, RAND, Arroyo Centre, 2001, Chap4.

from a safe concealed position[27]. This will complement the Swarm Force as they probe for an avenue of least resistance through the BUA. In addition, air-bursting munitions[28] that is able to penetrate glass windows and wire meshes besides having the capability to destroy wooden doors will be useful for close combat and breach unexpected avenue of approach to hit the enemy.

Mobility[29]

The high mobility vehicles need to be stealthy. Electric drive vehicles will enable the force to infiltrate at night without being detected, thus enhancing the survivability of the force. The other forces e.g. KINs and Clearing Forces will need an armoured motorised platform for sustainability and provide the heavy firepower when required. These vehicles will depend on speed for protection and be equipped with integrated explosive armour to defeat short-range anti-armour weapons.

Unmanned Platforms[30]

Robots and micro unmanned aerial vehicles are useful assets when operating in BUA. In employing the Swarm theory, these unmanned platforms may be released in huge numbers, each guided by a swarm algorithm to attack a sector before the human Swarm Force enters the BUA. The unmanned systems will operate like an army of ants or a swarm of bees in overwhelming the enemy or to collect intelligence not readily available

[27] Christopher F Foss *et. Al., The Long Range*, Jane's Defence Weekly, 18 Dec 02, pp27.
[28] Mahmud M. G., *Lightweight Artillery: New Generation Automatic Grenade launchers*, Asia Defence Journal, 4/2001, pp20.
[29] Ogorkiewicz R. M., *Armor for Light Combat Vehicles*, Jane's International Defense Review, July 2002, pp41-45
[30] Mark Hewish, *GI Robot*, Janes International Defense Review, Jan 01, pp34-40

to conventional assets. They maybe controlled by the soldiers and will be cheap enough to be disposable.

IKC2 – a leadership endeavour

While IKC2 is a tool to reduce chaos, this machinery needs to be powered by soldiers equipped with the right leadership competency. The leadership model proposed by McCann and Pigeau may allow us to study how leadership affects in the areas of Competencies, Authority and Responsibility (CAR)[31]. This model will be used to explore areas we should focus on in shaping our leaders for fighting in BUA in an IKC2 era.

Competencies

The four domains affecting Competencies are physical, emotional, interpersonal and intellectual. The leader in the IKC2 urban battlefield will lead smaller groups. He will need higher standard of combat fitness with **emphasis on agility** so as to operate independently within the 3-dimensional battle-space. The second aspect is the emotional fitness of the leader. The leaders will need to be **psychologically prepared** to face the rapid changing situation in a BUA while at the same time to motivate his soldiers when situations become difficult. In a IKC2 battlefield, decisions and actions will be executed at an accelerated pace, and the battle for survival will often be decided in a split second, the leader must be more psychologically composed to make independent unbiased decisions. Having forces dispersed throughout the city, good interpersonal skill in

[31] Ross Pigeau and carol McCann, *Reconceptualising Command and Control*, Canadian Military Journal, Spring 2002, pp 53 – 62.

relaying his orders to his subordinates is crucial; commanders will give orders in a virtual environment where no personal contact is made. **Understanding the intent** of his superior will become even more pronounced. Intellectual competency requires the leader to analyse the fast flow of information and sieve out what is pertinent to his mission. Often, he will need to **innovate** for new ways of achieving his mission in an ever-changing environment. This requires the commander to be **critical** of the problem yet **creative** in seeking for a solution.

Authority

With IKC2, the commander must possess a high degree of autonomy to make decisions so as to exploit the available opportunities in the battlefield. As such, **empowerment** and trust by the superior must be present to create this condition. Superiors may have reservations in allowing a junior commander at an isolated corner of the city to direct air strikes to destroy a target of opportunity. However, with the IKC2 environment where intelligence on enemy movement is relayed in real time through the extensive webs of communication nodes, uncertainty is drastically lowered, thus **reduced risk of fratricide**. The hierarchy of constant reporting and **seeking for permission to strike will be reduced significantly** with a flatter command structure. The soldier will be entrusted to strike within the boundaries, guided by **centrally controlled** intelligent-based agents.

The authority of junior commanders, now empowered with the responsibility to destroy targets with precision strike missiles, needs a cultural shift in the mind- set of the leader. He will no longer have the comfort of seeking authority from his superiors at his liberty;

instead he will have to make the decision based on his analysis. Similarly, the senior commanders having delegated the responsibility to his junior commanders will need to be more tolerant of failures and have a flexibility of mind to constantly challenge the current ways of conducting the battle and receptive to alternate methods. In peacetime, the culture of questioning beliefs to understand the mental models is the key to maintaining battlefield flexibility in an uncertain environment. Organization Learning aims to address this cultural shift.

Responsibility

The leader's moral responsibility and obligations means that he is professionally accountable to his superiors yet have the integrity to do the 'right thing' under battlefield stress. In future, where robots generate the courses of action, it is imperative that the commander understands the **humanitarian effects** of each option based on collateral damages, risk of fratricide and unnecessary destruction of enemy troops. This means that leaders will need to be well versed in international laws governing armed and unarmed conflicts, besides being 'trained' in ethics and believing in organizational values so that firepower will be used in the right amount against the right targets. The challenge is how to instill these essential qualities and beliefs in the leaders so that he may be a 'warrior diplomat'.

Conclusion

The Chaos Theory offers another perspective to how urban warfare maybe fought without going against the natural order of things. By understanding the characteristic of a BUA in terms of the Chaos Theory is important to understanding the fluid characteristic of uUrban operations. The concept of introducing chaos in the centre of gravity of the city while swarming the enemy from the outside of the BUA is worth further exploration. This concept of **seek-penetrate-clear** will allow our force to maintain control yet throwing the enemy in chaos.

Force structure will become more joint and tasked organised to deal with the rapidly changing situation. The combined capabilities of each task force will be synergistic in tackling a well-entrenched enemy by functionally dislocating his defence capabilities. The use of emerging technology will enhance the lethality and survivability of the force. These technologies will support IKC2 at the tactical level to as a force multiplier to ensure that the task of capturing the BUA is done in the most cost-effective manner while maintaining minimal collateral damage.

Though IKC2 is the technology enabler to facilitate new ways of fighting BUA, the soldier is an important part of this warfighting process. It is worthwhile to examine how the leadership competency many change in an IKC2 environment.

In future, with IKC2, fighting in urban terrain will be less resource intensive. There will be minimal own casualty and collateral damages yet conducted in the most cost-effective

way to meet the operational and political objectives Perhaps then, we will emerge from the chaos of war and navigate with greater certainty.

BIBLOGRAPHY

James Moffat, *Complexity Theory and Networked Centric warfare*, CCRP, Sep 2003.

Edward A. Smith, *Effects Based Operations*, CCRP, Nov 2002.

CAPT Donald Inbody *et. al.* (editors), *Swarming: Network Enabled C4ISR*, Conference Proceedings, Joint C4ISR Decision Support Centre, 13-14 Jun 2003.

John Arquilla *et. al.*, *SAWRMING and the Future of Conflict*, RAND, National Defense Research Institute, 2003.

Sean Edwards, *Swarming on the Battlefield: Past, Present, Future*, RAND, National Defense Research Institute, 2000.

Sean Edwards, *MARS Unmasked – The Changing Face of Urban Operations*, RAND, Arroyo Centre, 2000.