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Human Performance Issues in Urban Military Operations

R.S. Collyer

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ABSTRACT

This paper outlines the key human factors issues associated with urban operations. It first describes the urban operations environment from the commanders' and soldiers' perspective. It then uses their perspectives to identify the human factors which should be considered in the development of a system for conducting urban operations.

The urban environment is characterised as comprising three subsystems, physical, functional and social, and discussion of the issues that influence human performance in urban warfare is structured around well established principles of human performance in combat, but relates these to the anticipated specific nature of urban warfare.

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Human Performance Issues in Urban Military Operations

Executive Summary

World urbanisation has increased rapidly during the past 30 years, and this geographic and social phenomenon is expected to continue. It is common for an enemy, particularly one engaged in asymmetric warfare, to utilise the complex urban environment to generate combat power, especially when dealing with an opposing force which possesses more sophisticated technological weapon systems.

In the military sense, urban centres are centres of gravity because they are psychologically symbolic, and economically and culturally powerful. They represent the hub of politics, culture, services, manufacturing and transport. As centres of gravity they are doctrinally significant military objectives in any conflict.

In conflicts last century, and in the few years of this century, the Australian Army conducted many of its operations in urban environments. Present Government guidance, leading to the doctrine of Manoeuvre Operations in the Littoral Environment, requires the Army to further develop its capacity to operate in urban terrain, increasingly in Joint and Coalition environments. This requires Army to develop a modern system of doctrine, training, structures and equipment for urban operations.

Historically, urban combat has been expensive in deaths of soldiers and non-combatants, destruction of infrastructure, consumption of military logistics resources, and often also in political terms in the domestic and international arena. Any revised or new urban combat system must endeavour to maximise combat effectiveness while conserving not only the combat force, but also non-combatants and urban infrastructure. Central in any combat system is the soldier – the human operator within that system.

This paper outlines the key human factors issues associated with urban operations. It first describes the urban operations environment from the commanders' and soldiers' perspective, and it then uses their perspective to identify the human factors which should be considered in the development of a system for conducting urban operations.

The paper characterises the urban environment as comprising three subsystems, physical, functional and social. The physical system is the angular, man-made and natural environment represented in three dimensions, and which generates killing grounds not always familiar to soldiers trained in traditional open manoeuvre fields. The functional subsystem is the complex network of transport, communications and utility infrastructure, and the social subsystem is the human dimension to the urban landscape.

Discussion of the issues that influence human performance in urban warfare is structured around well established principles of human performance in combat, but relates these to the anticipated specific nature of urban warfare. Factors discussed are combat stress,

fatigue, morale, cohesion and team functioning, dealing with non-combatants, psychological operations and civil-military liaison, coping with the physical environment, coping with the cultural environment, human issues with some equipment, the importance of rules of engagement/status of forces agreement, the potential for including non-lethal weapons in an urban combat system, and the criticality of medical support.

In any form of warfare the single most important factor is the human will-to-fight – to risk your life, to kill other human beings, and to direct others to kill. This will must be created and maintained in a chaotic environment. In urban operations the nature of the environment is different from that traditionally preferred for manoeuvre warfare. Maintenance of the human will-to-fight depends most on training in basic soldier skills, and skills to use the equipment available, and on leadership, self-discipline and teamwork, all practiced within an urban operating environment. The acquisition of new technology and equipment is important, but secondary.

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1. Introduction

> The worst policy is to attack cities.
> Attack cities only when there is no alternative.
>
> *Sun Tzu: The Art of War*

If success means having large numbers of troops on the ground throughout a city and a substantial measure of control over governing and administering that city, then it is probably true, historically, that few attempts to capture cities have been unsuccessful in the long term. It is also true that, to be successful, they were inevitably very 'expensive' campaigns in terms of destruction of infrastructure, death of soldiers on both sides and non-combatants, and consumption of resources such as ammunition, numbers of troops, medical capacity and equipment, e.g. Berlin, Hue City, and Grozny. Even in more recent conflicts, such as Iraq, where damage was relatively low compared to historical operations, there is no guarantee that the long-term destruction will not be similar.

Militarily, this destruction and cost in resources detracts from the capacity to preserve the combat power for employment elsewhere. Politically, modern wars are won and lost more by international opinion and social and political bloc pressures than by military effort, and costly urban war fighting often does not gain unqualified political support. Where asymmetrical warfare has involved more than just one urban centre, such as a number of urban centres and other complex terrain, huge expenditure of resources has not necessarily lead to victory, e.g. Algeria, Vietnam, Lebanon, the Palestinian West Bank, Somalia, Chechnya and, arguably, Northern Ireland. In Chechnya, in spite of several battles through the city over the past decade, Russia cannot be considered the victor in what remains an ongoing war.

As a generalisation, in the past commanders have preferred to avoid fighting in urban terrain and tried to utilise their force manoeuvre capabilities in open country. When forced to fight in villages, towns and cities, fire support and the intensity of close order fighting has usually resulted in substantial destruction of the urban environment. This has required a major 'recovery' program by whichever force eventually controlled the urban centre, and has often had a significant impact on the psychological dimension of warfare as reflected by attitudes in the population centre and through international community acceptance or rejection of the military action. This impact on the psychological dimension has also had a significant influence on the combat performance of soldiers at the tactical level, and has frequently been pivotal to success at the operational and strategic levels of warfare.

Urbanisation is both a geographic and a social phenomenon. It changes the physical geography of an area and it also changes human beings socially, psychologically and behaviourally [Williams and Brunn 1993]. The urban world increased rapidly during the last 30 years of the twentieth century as technology rapidly increased and the world became more integrated through the globalisation of economic and social activity. With the growth in the number and size of towns and cities, and their spread into new

territories, there are now few regions that do not contain urban populations of varying types [Clark 1996]. It is increasingly common for relatively small, poorly equipped enemy forces to utilise urban terrain as a 'combat multiplier' in their fight with larger and more technically sophisticated foes. It is a combat multiplier because urban areas can counter the mobility, firepower and communications advantages of technologically superior forces. The use of urban centres can also buy time to assist with the political dimension of warfare. Urban centres are centres of gravity for an enemy because they represent the hub of politics, culture, services, manufacturing and transport. They are psychologically symbolic, and they are economically and culturally powerful centres. As enemy centres of gravity they are doctrinally significant objectives for friendly forces.

Because of these trends towards urbanisation and the significance of urban centres as centres of gravity in the military, economic and political context, the ability of a modern military force to wage urban warfare is critical to future operations, including potential operations identified for the Australian Army [Department of Defence 2001, Australian Army 2002]. It is therefore necessary for combat systems and doctrine to be developed to enable Australian forces to conduct urban operations. Urban operations are also referred to in the literature as Military Operations in Urban Terrain and Fighting in Built-Up Areas. Any combat system developed for urban operations must take into consideration the human characteristics, the 'human factor', of the system, both from the enemy and the friendly force perspective.

Just what does constitute 'human factors' is often a matter of debate, and views frequently differ depending on the background of the perceiver. Often, human factors are considered to be 'anything dealing with people'. On the other hand, a narrower view is that human factors must be directly related to equipment design [e.g. Chapanis 2000].

Human sciences, of which human factors is a significant part, refer to the study of human capabilities, limitations and tendencies. Human sciences comprise many disciplines and many labels, including human physiology, psychology, workplace design, expert systems, human-machine interface design, ergonomics, instructional design, aerospace engineering, biomechanics and artificial intelligence. The usual goal of human sciences is to develop an understanding of human performance so that interventions can be developed to facilitate an optimal relationship between humans and the demands and characteristics of the workplace within which they operate [Murphy 2002a].

Human science researchers usually focus on the performance of work systems. A popular model, which gives a good guide to the human factors issues involved and is useful for gathering data as part of a systems analysis, is the SHEL(L) model as adapted by the International Civil Aviation Organization [ICAO 1989] from Edwards' SHEL model [Edwards 1972]. This model considers four factors which interact to provide a five-component model of the system: the written and verbal rules and procedures which govern the interaction (Software); the equipment used (Hardware); the various conditions in which the system operates (Environment); and the individuals who operate within the

system (Liveware). Each individual operator interacts with each of these four components, including liveware to liveware interaction with the other humans.

The following definition: 'Human factors is concerned to optimise the relationship between people and their activities, by the systematic application of the human sciences of psychology, physiology and medicine, integrated within the framework of systems engineering.' [Hawkins 1987] is sufficient to fit the needs of this paper on human factors in urban operations. It is sufficiently specific, yet permits consideration of many aspects of human performance within the urban operations system. Perhaps the only addition to that definition is to make explicit the fact that 'to optimise the relationship between people and their activities' is directly concerned with combat performance and preservation of the combat force.

2. Aim and Scope

This paper aims to outline the key human factors issues associated with urban operations. It first describes the urban operations environment from the commanders' and soldiers' perspective, and it then uses their perspectives to identify the human factors which should be considered in the development of a system for conducting urban operations.

3. The Urban Operations Environment

Urban terrain is a complex, man-made environment unlike the terrain in which soldiers have traditionally trained for combat. It is characterised by three subsystems, physical, functional and social [Thomas 2002]. Physically, urban terrain is comprised of angular forms laid out in a grid pattern with a lot of cover and frequent, regular, channelled fields of fire and 'killing grounds'. Buildings may be of many styles within the one urban centre. It is three-dimensional, where the vertical dimension is of great importance. The vertical dimension not only provides extreme barriers to assault, but it also provides the defence with a man-made form of 'high ground' – and often also with a subterranean level for combat by way of cellars and sewers [c.f. Ellefsen 1987]. The force in possession of this terrain, especially with time to prepare defences, has a distinct opportunity to reduce any disadvantages that it may have compared to the attacking force. In particular, it usually forces the combatants into small unit engagements at close range.

The urban terrain's non-physical environment is also very important. The functional subsystem represents the lifeblood networks of the city, such as transport, communications and utility networks. These networks permit the inhabitants to thrive and the enemy to survive. Modern cities have formal subsystems characterised by centralised administration, industrial or post-industrial technologies, links and nodes. Primitive cities

normally contain informal decentralised subsystems in which primitive or adaptive technology predominates, with patterns of individual and small group activity. In primitive cities, nodes are highly decentralised if they exist at all [Thomas 2002].

The social subsystem represents the human dimension, the culture, demographics, religion, and history of the urban setting. This is perhaps the most difficult subsystem to grasp because it is usually such a complex, interwoven network of factors. Culture is a particularly powerful influence. Culture relates to the way in which definable groups of people interact with their social and physical environment. It helps to define a group, especially in relation to other groups. This applies to nations, races, religions, tribes, clans, professions, in fact to any group. Culture consists of learned behaviours arising from shared knowledge. It is passed on from one generation to the next. The behaviours that become embedded as part of a group's culture are those that have helped to ensure the group's survival in the past. Culture is reflected in the group's values, beliefs, rituals, symbols and behaviours [Hofstede 1991]. While culture does change, change is usually slow, particularly in terms of military operations' timeframes.

Ralph Peters [Peters 2000] formulated a three-level description of social subsystems, and this itself shows the power of culture and how the urban factors are interwoven. He describes hierarchical, multicultural and clan based urban centres. He describes hierarchical cities as familiar to Americans (and Australians). They are hierarchically structured for control (chains of command) within a system of law, where citizens have responsibilities for payment of taxes and patterns of public behaviour. They expect to not be cheated by government or merchants, to benefit from utilities such as light and water, and to be protected by police or military forces. Such cities can provide major resistance to an attacker, but can also be easy to manage once conquered.

Multicultural cities are divided by struggle for power by ethnic, religious or criminal groups. They have vying customs and systems of beliefs. Chains of command exist formally, but are more voluntary in compliance with directions. Power is diffused beyond legal agencies into the vested interest groups and makes such cities much more difficult for an attacker to understand, and once conquered, they can be difficult to oversee. A partisan ally today may undermine apparent success tomorrow. Peters nominates Jerusalem with its irreconcilable differences between Arabs and Jews as the pre-eminent example of a multicultural city today.

According to Peters, tribal or clan-based cities are the most difficult urban environments for military operations. Power is based upon differences in blood but not race or religion. Race or religious affinity is comparatively easy to identify compared to clan. With clans, knowledge is required of the individual with whom dealings occur. Peters cites Mogadishu, Kigali, Dushanbe and Karachi as examples where violence occurs between those of the same race and similar or identical religion, and he includes in this category conflict in the former Yugoslavia. Similar circumstances applied in Beirut in 1982 [Tamari 2001] and in Afghanistan for the present war against terrorism [CSIS 2002]. In these cases other cultural, economic and political factors blurred the original tribal origins. Lievan

[2001] reinforces the need to know your enemy's society and to avoid the common practice of applying a series of stereotypes, which can be almost as dangerous as sheer ignorance. He provides an interesting analysis of the Russian war in Chechnya, where the Russians assumed a clan-based society and power structure based on historical ethnic background. They assumed primacy of a traditional clan loyalty, but the true affiliation was based more on uniting against a common historical foe (Russia), loyalty to the extended family and, in some cases, to criminal groups which transcended tribal origins.

Urban environments and foreign cultures can be complex terrain for the conduct of military operations. For Australia, missions involving urban operations have, to date, been on foreign soil, and this is probably the case for the foreseeable future [Department of Defence 2001]. This presents the potentially stressful prospect of operating in a complex, unfamiliar physical, political and social environment, perhaps a long way from home, and among a large population of non-combatants. Sometimes the non-combatants will be unfriendly. Often it will be difficult to identify friend from foe in the close-range encounters that will occur in urban areas. The structure of urban terrain provides good cover and many observation posts. These together with the presence of a large number of non-combatants have a significant restricting influence on the soldiers' traditional approach to fire and movement during the assault.

Small groups, down to section and even half-section will frequently be the 'unit of operation' in the urban environment. There may also be 'other arms' attached as part of the fighting teams. The structure and construction of urban terrain can be expected to have a significant negative effect on the command and control of urban operations. Fields of observation will be restricted and communication and navigation severely disrupted. The disrupted communications and navigation will create problems calling in fire support. It will also mean that the transmission of intelligence, both up and down the chain of command, will be disrupted. The operational tempo will be high, reducing the timeframe for decision making and reacting. Units may frequently become disoriented or confused, increasing the stress for soldiers and the chances of significant human errors, such as firing on friendly forces or non-combatants. All of these factors make it more difficult for senior leaders (company, battalion, regiment, brigade commanders) to keep up to date with the progress of the battle, and may make it more difficult than in non-urban warfare for these leaders to provide feedback to operational and strategic commanders.

The World War II approach to combat in urban terrain was heavy pre-assault bombardment, and continued heavy fire support while areas were cleared and held room-by-room, building-by-building and block-by-block. This was a bloody, expensive, disorienting, time-consuming and manpower intensive attrition style of combat. Fighting was at close quarters, within and between buildings, horizontally and vertically, absorbing manpower and munitions. Non-combatant casualties were also very high, both during the fighting, and from disease and starvation resulting from the disruption to urban functioning. Once cities and towns were secured they had to be re-supplied and substantially re-built to be of further use to the attacking force and to the civil population [cf. Gerwehr and Glenn 2000]. This style of mass destruction and savage close order

fighting has continued to be the norm for urban warfare, as demonstrated in Hue City, Baria and Binh Ba, Beirut, Mogadishu and Baidoa, Kosovo, Grozny and numerous Palestinian West Bank towns. Although it persists, this style of warfare has become increasingly politically and socially unacceptable in the modern world.

The civilian population depends upon the buildings and urban infrastructure for protection from the weather, and for water, power, sanitation, food supplies, medical services and other support. Foreign embassies claim privilege from being over-run. Often there is a plethora of non-government organisations (NGO) such as the Red Cross, Médicins sans Frontières, and various Care organisations, all trying to provide humanitarian assistance to the population. The local population and NGO will make demands on commanders, individual soldiers and military supply systems for security, transport, food, water, medical supplies, and protection from the elements.

Large-scale destruction of urban environments, while acceptable to some combat forces, is generally unacceptable to the majority of nations and may lead to political and sometimes economic sanctions against a nation and/or a military force. Generally, such destruction is culturally unacceptable to Western nations even under extreme circumstances, and this is certainly true of most Australians. The manner in which the invading force treats the population also has significant influence on any future support that the population may provide.

Urban terrain amplifies the ease and effectiveness of deception and leads to short range engagements with little time for preparation. It makes it difficult to identify friend from foe thus increasing the likelihood of fratricide. Casualty rates are very high, and ammunition and other supplies are consumed at a very high rate. Some weapons, designed for open country, may have problems in urban terrain, e.g. barrel depression or elevation on armoured vehicles and artillery. Coordination of air attacks, either for lodgement of forces or fire support may be difficult. GPS may be blocked and radios will only work over shorter ranges making coordination and navigation difficult.

Urban warfare is exceptionally fatiguing (both physically and mentally) and dangerous and it provokes highly destructive, stressful, high intensity close combat that leads to significant logistical and medical challenges. Australian Army training has in the past usually provided a sound basis for adapting to new operational environments, but each environment should also be evaluated for its specific requirements. By way of example, it was frequently stated that training for warfighting was adequate preparation for Australian soldiers to deploy as peacekeepers. Many who worked on peacekeeping missions questioned if they had been adequately prepared. Empirical studies by Schmidtchen [1999] supported this belief. Recent experiences in East Timor have reinforced the need for training specific to peacekeeping operations, while still emphasising the need for expertise in basic military fieldcraft and skills [CAL 2001]. There is a need to evaluate doctrine, organisation, training and equipment to ensure that they meet the specific needs of urban operations. Each of these has human factors implications.

4. Human Factors Issues and Performance

The following sections discuss key human factors issues that need to be considered when developing a system for conducting urban operations. The human issues are complex. It is, however, the human (soldier, politician, terrorist, non-combatant) who must make the decisions and must fight, seize and hold ground. Therefore human issues are interwoven with almost every aspect of urban operations.

4.1 Combat Stress

'Stress is the physiological and psychological reaction that occurs when individuals perceive an imbalance between the level of demand placed upon them and their capacity to meet that demand.' [ADFP 714]. This is a generalised definition that describes stress whether that stress is placed within a civilian occupational model or a military operations model. Key features are that there are substantial individual differences in peoples' responses to stressors, and the impact on the individual can range from minor discomfort to major dysfunction. Most operational stress is a normal reaction to a very abnormal situation, and it does not constitute a psychiatric illness, although it may become one, i.e. it is usually transitory but can become a permanent disability. In military operational terms, any dysfunction resulting from operational stress degrades combat capability, either in the short- or long-term.

The impact of operational stress on military capability is greater where one or more of the following risk factors (common stressors) are present [ADFP 714]:

- exposure to the operational stressor is of long duration and/or high intensity;
- there is a high risk of physical injury, loss of one's own life, or where there is a sense of loss (such as comrades but also including loss of personally valued possessions, such as a house and belongings in a destructive conflict or natural disaster);
- there is exposure to human misery and atrocities, especially on a large scale such as in displaced persons' camps or massacre sites;
- bodies are handled;
- there is a sense of isolation such as being far from home, family and friends, communications to home are poor, or the dominant culture is alien (cultural isolation);
- there is a perception of a lack of support for the operation from the government and/or society back home, raising doubt about the legitimacy of the operation;
- there is a perception that leadership, equipment, tactics, or training are deficient;

- there is a prevalence of drug or alcohol misuse, which can be a sign of low morale, poor discipline or leadership, or lack of self-confidence and is indicative of an inability to resolve emotional turmoil; and

- there is a risk or potential of being taken hostage or becoming a prisoner of war (POW).

Experienced combat leaders and researchers identify urban operations as high intensity warfare that makes inordinate demands on both logistics and available manpower [e.g. 5RAR undated, Dewar 1992, Grau and Thomas 2000, Howard 1987, NDIA undated]. Lessons learned indicate long duration and high intensity are not only risk factors for soldiers' combat stress reaction, but they are also risk factors for unit combat effectiveness. Once a unit's combat effectiveness is degraded past a certain difficult to predict level, that unit ceases to be effective and requires substantial time and other resources to re-build. This lesson was reinforced by the Russian experience in Grozny [Grau and Thomas 2000]. The preparedness of the Russian troops, particularly for the first and second Chechen wars, reflected many of the combat stress factors that ADFP 714 identifies as risk factors. A survey of Russian soldiers found that, for the first war (1995), 72 percent of Russian soldiers suffered some form of psychological disorder [Thomas and O'Hara 2000]. This should not be mistakenly viewed as only a Russian problem. ADFP 714 provides Australian, Israeli and US reference to high combat stress reaction casualty rates. The US planned for a 25 percent combat stress casualty rate in the Gulf War. US Marine Corps analysis of the Russian Chechen wars concluded that for urban warfare there was a need for a large number of trained soldiers so that units could be frequently rotated. This merely re-stated one USMC lesson learned from Hue City, Vietnam [NDIA undated].

Soldiers in combat always face risk of injury or death, to themselves and their comrades. The nature of urban warfare with its artificially created high ground, channelled movement, frequent killing grounds, and intense, short-notice close combat is the type of warfare that accentuates the risks of a soldier or comrade being killed or seriously injured. Among all these complexities of urban operations, it is the way soldiers perceive a situation that is crucial to their reactions, more so than what is factually correct. The level of danger is important because it influences what soldiers perceive as the risk level. If soldiers believe that they are well supported, equipped, trained and led, they will be more resistant to combat stress than if any of these elements are perceived to be deficient.

Exposure to mass destruction and large-scale human misery is a well-documented cause of stress to soldiers [Collyer 1995a, 1995b, 1995c]. These empirical findings from peacekeeping missions in Rwanda have been reinforced by, for example, experience and research findings from Namibia, Cambodia, Somalia and East Timor [Murphy, Collyer, Cotton and Levey 2003]. Urban warfare is likely to present the soldier with visual scenes of death of combatants and non-combatants, mass destruction, and large numbers of homeless people whose possessions and perhaps livelihoods have been largely destroyed. Visual images are emotively powerful, but so are sounds, and especially the smells of death and destruction. Soldiers who have been involved in such conflict, regardless of the

best of intentions for the outcome, such as ousting guerrilla fighters, may be strongly affected by their experiences.

Separation from family or friends, lack of support that they usually provide, and being unable to provide reciprocal support are frequent stressors to soldiers when on operations. Support needs to be, and be perceived as, sound at the tactical, operational and strategic levels. One problem experienced by Vietnam veterans on their return to Australia was the lack of support from sections of the community and from many in the parliaments, including the (newly elected) federal government. Such a lack of support is frequently a factor in converting a temporary combat stress reaction into a more permanent disability such as depression, Acute Stress Disorder or Post-Traumatic Stress Disorder (PTSD). The term 'PTSD' derived from the need to classify the long lasting psychological dysfunction of Vietnam War veterans. After the Vietnam War, about 30 percent of veterans were estimated to suffer dysfunctional psychological reactions, and about 15 percent of survivors still experienced these twenty years afterwards, in both Australia and the United States [ADFP 714, DVA 1998, Kulka *et al*, 1990, Pearn 2001].

Support also needs to be provided to families so soldiers have fewer concerns about their responsibilities back at home. Furthermore, the long-established need for communication from families to soldiers remains crucial when a soldier is a long way from home, often tired, and perhaps frustrated because of immediate doubts about either personal safety or the worth of the mission.

If soldiers believe that they are well trained and are led by NCO and officers in whom they have confidence, they will be more resilient to operational stress. This resilience increases if they also have equipment that they believe they are well trained to use and that is appropriate to the job.

4.2 Fatigue

For many soldiers on operations, the hardest part in their view is usually the continual workload over extended periods. Fatigue is the product of intense and prolonged emotional strain, inadequate diet, strenuous physical exertion, unfavourable environmental conditions and sleep loss [Murphy 2002b]. Fatigue is a primary stressor. It is mentioned separately here because fatigue can cause stress even when combat conditions do not prevail. In this case it may be more like occupational stress. On the other hand, when intense combat conditions exist, fatigue is an issue that must always be considered by combat leaders.

Fatigue can have two categories, acute and chronic. Acute usually occurs as a result of severe sleep loss, often accompanied by high levels of energy consumption – as in preparation, movement to and deployment into an Area of Operations. Chronic fatigue is more insidious because it comes from a slow, sustained build-up of fatigue, such as from trying to maintain operations with inadequate levels of personnel. Both forms of fatigue

affect both combat service support and combat forces. Commanders at all levels are especially vulnerable to the impact of fatigue on their effectiveness.

Recent Australian civil research by Dawson and colleagues [Dawson and Reid 1997, Dawson, McCulloch and Baker 2001] reported how performance is influenced by the nature of the work performed. It also showed a direct relationship between standard of task performance when fatigued and performance at varying blood alcohol levels (BAL). For example, after 17 hours awake, task performance is roughly the same as if an individual had a BAL of 0.05 (the legal driving limit for Australian states). More significantly, after about 25 hours of wakefulness, task performance is at about the 0.10 BAL level. Soldiers are not permitted to drink alcohol on duty or to report for duty when affected by alcohol, but fatigue can have the same dangerous impact on combat performance and on routine unit safety.

Military forces have developed technology (e.g. night vision equipment) that make it possible to conduct operations 24 hours per day every day, and people may be required to operate that equipment around the clock for days and possibly weeks at a time. Sustained workload, both cognitive and physical, combined with fatigue, especially after one or two nights of total sleep loss or longer periods of fragmentary sleep, degrades performance, safety and ultimately, mission effectiveness. Sleep loss interacts with workload resulting in reduced reaction time, decreased vigilance, and perceptive and cognitive distortions, all of which will vary as a result of individual reactions and experience [Murphy 2002b].

Urban warfare is predicted to be a high workload, highly fatiguing style of military operation. Endurance of individuals must be fully monitored to minimise the effect of sleep loss and cognitive and physical workload in continuous operations, and therefore maintain higher levels of sustained collective performance and activity. Fatigue is a major stressor, and generally speaking, its symptoms are similar to those of stress induced by other means. Remedies for fatigue-induced stress are also suitable in part for other stress, but invariably the best cure for fatigue is rest and restorative sleep.

If forced to operate while fatigued, as with other forms of stress, military skills need to be reinforced to such a level that the individual will act instinctively. The fatigue factor may at times be overlooked in Australian military forces. However, fatigue was considered a significant contributor to unauthorised discharges of weapons on OP SOLACE in Somalia [1 RAR Bn Gp 1993]. Combined with other operational stressors, fatigue was a contributing factor to unauthorised discharges during the preparation for and deployment in East Timor [CAL 2002, COMASC 2000, Hall 2001] and in South Vietnam [Hall 2001].

4.3 Morale, Cohesion and Team Functioning

Both S.L.A. Marshall and Ardant du Picq [cited in Keegan 1976] believed that an army is a social organism, governed by its own social laws, and that formal discipline, imposed from above, is of limited utility in getting men to fight. Indeed, most troops are part of a team. The team can be both a source of stress and a counter to stress, depending on a

number of factors. The majority of men are unwilling to take extraordinary risks and do not aspire to be heroes, but where they do occur, group integration, friendship, focus on the task and sound leadership can produce a cohesive, high-morale, team.

Morale and cohesion of military forces are often reported synonymously, yet they are quite different organisation attributes. While the concepts are similar and studies with Israeli soldiers have shown them to form one integrated factor [Gal 1986], generally morale relates to the individual level, whereas cohesion relates to the group level [Yagil 1995]. That is, when the primary motivating incentives are extrinsic, such as monetary, little personal commitment develops, leading to low cohesion. In comparison, intrinsic motivating factors, such as loyalty to one's friends and belief in organisational goals, leads to strong cohesion and thus high morale.

Morale has long been accepted as one of the Principles of War [LWD 2002], but it is hard to define and difficult to measure. It is, however, obvious to both participants and observers when morale is high or low. Morale contributes positively to the combat ratio, whereas cohesion 'does not directly enhance performance, but rather buffers the individual from the harmful effects of stress on the individual's health' [Yagil 1995 p.7). She reports that Israeli soldiers in highly cohesive units were less likely to incur combat stress reactions than were soldiers in units with lower levels of cohesion.

Isolation can have a profound impact on a soldier's morale and resistance to combat stress. Isolation may be real or perceived, but to the soldier it does not matter because perception is interpreted as reality [Flora 1972]. In a modern war a soldier may be isolated from the enemy, cannot see him or impact him, but can still be subject to the impact of the enemy's weapons. Further, because of not wanting to be seen and therefore targeted by the enemy, supporting forces may also not be visible to own forces, thus reinforcing the sense of isolation.

The nature of the urban operating environment fragments units and strains command and control systems. (It can be a lonely task for one or two soldiers guarding a cleared building.) Although feelings of isolation from support may be false, they can still strongly influence the soldier coming under enemy fire. If provision of fire support from other team members or from platoon or company weapons is not forthcoming when expected, the soldier might feel increased isolation and be more susceptible to combat stress. The perception of isolation from the enemy, isolation from his own fire support and from his sub-unit can have a major impact upon a soldier's capacity to fight, especially when suffering the other stresses of combat [Bonner, Collyer and Kaine 2002].

The Australian Army emphasises collective training and training as teams (e.g. sections, platoons, and companies). This works to reduce operational stress. However, when cohesive teams are not built, Australian experience also confirms the negative impact on soldiers. During the ADF deployments to Rwanda, where contingent members were exposed to massacres, large scale destruction of towns and villages, and mass human misery, the major security force for each contingent was an infantry company. These

infantry deployed largely as formed companies. The support and medical elements were composite companies compiled from many units, most at very short notice, and then deployed to the middle of Africa. The empirical findings of stress tolerance [Collyer 1995a, 1995b, 1995c] showed the infantry companies (cohesive teams from formed sub-units and sections) to be most resilient. This was the case even though the nature of the mission was a medical support one and the medical companies could be considered to have been operating in their normal medical support environment. A team that has bonded together, has complete trust and confidence in one another, and is well led, will be a formidable military organisation. Doubts about its leaders or obstacles in the path of mutual trust and confidence, even if only a lack of time to train together, will cause stress in individuals and degrade operational performance and preservation of the combat force.

Most of Australia's operational deployments over the past 40 years have been coalition operations, and this will probably continue to be the case. Under these circumstances there will be limited opportunities to develop as teams with other national members prior to deployment. Within the Australian contingents, it will remain important to sound psychological well being and mission success that teams are formed, trained and bonded prior to deployment, and this should always be a military aim, especially when deploying to fight in urban environments.

4.4 Non-Combatants

Urban operations have a very attentive audience, through the world media, but also through non-combatants who must also be influenced. While psychological operations should therefore be directed at non-combatants as well as enemy forces, the process of influencing non-combatants ranges across the entire prosecution of the urban operation and is perhaps most influenced by the behaviour of troops in the field as formed bodies and as individuals.

During the Gulf War, in Kosovo, Afghanistan, and recently in Moscow, terrorists and state-sponsored asymmetric forces demonstrated their preparedness to use civilians and civilian facilities as shields. The actions of such groups blur the line between terrorist and combat element, religious elements and functions, educational, humanitarian, and medical elements and functions, and peaceful political elements and political action [c.f. CSIS 2002]. While Keegan and Darracott [1981] maintain that it is the hallmark of primitive and barbarian warfare that those who suffer worst by it are those who are weakest – women, children, the old and the wounded – it is probably more correct that all warfare is primitive and barbaric and most non-combatants suffer to varying extents. It is also frequently difficult to correctly classify combatants and non-combatants.

The presence of non-combatants within an area of military operations is always going to be of concern to soldiers who do not want to kill innocent civilians. Some enemy will deliberately mix with non-combatants, dress like non-combatants, and will use areas such as schools, churches and hospitals as strong points and as sites from which to launch attack. Even with the best of intentions, the forecast high intensity and large scale of

destruction of the urban environment means non-combatants will be at considerable risk. Exacerbating the risk is the difficulty of identifying enemy from non-combatants in many operational environments. Methods of identifying/designating friend from foe should receive a high priority.

It can be expected that the media and NGO will report any friendly action leading to non-combatant injury or death, and any destruction of community centres, and this may create external pressures on soldiers involved in urban warfare. In fact the media usually report 'newsworthy' stories whether they are factual, gossip or contrived [Birkholm 1993, Cohen and Greens 1999, Djordjevich 1992, Thomas 1996]. Well-organised political and media campaigns can blur lines of responsibility for terrorist acts and use collateral damage and human suffering as political weapons of war. The enemy will attempt to use, even to create, such situations to gain publicity for their cause, regardless of the truth. Bosnia is one good example of this, where US PR firms were engaged to conduct a PR campaign for opposing forces [Birkholm 1993, Cohen and Greens 1999]. These enemy 'psychological operations' involving non-combatants can have a significant negative influence not only at the strategic and operational level, but also on soldiers' and commanders' morale and actions at the tactical level. Consideration needs to be given to methods of countering these enemy actions.

Before, during and after the urban operation there may be large numbers of internally displaced persons (IDP). While NGO and UN missions may arrive in large numbers to start caring for these IDP, there will be pressure on Australian resources to make good much of the damage, to restore utilities, and to provide food and medical aid. In East Timor, Australian soldiers had to deal with tens of thousands of displaced persons crossing back into East Timor and reported that consideration needed to be given to the tactical handling of displaced persons, prisoners and detainees at the unit level [CAL 2001]. Experience in Somalia, Rwanda, and numerous other UN missions has shown that Australian soldiers can be greatly stressed by the large-scale human misery of non-combatants that these displaced persons' camps usually demonstrate.

Another disturbing aspect of dealing with both enemy combatants and non-combatants alike relates to differences in basic cultural beliefs. This can be particularly stressful when aspects of the foreign culture exhibit very different attitudes towards death, children, and females. By way of example, some Australian monitors with the UNIIMOG were shocked and stressed by the Iranian and Iraqi attitudes towards women. One description, provided by a peacekeeper to the author at the time of UNIIMOG, was that men viewed women as cattle to breed cannon fodder. Similar cultural attitudes, where men and male children, and even animals have been evacuated while women and female children were left in danger zones, have been recently reported by Australian troops returning from service in Afghanistan.

While a few soldiers may accept that some 'collateral damage' will include killed and homeless non-combatants, most Australian soldiers will find these add considerably to their operational stress. It is important to develop some ways of sorting out the

combatants from the non-combatants and managing the IDP problem. While accepting cultural attitudes that are greatly different from their own with respect to the treatment of women and children may be extremely difficult for many soldiers, they should at least understand that the differences exist and have reasonably realistic expectations of the differences that they will encounter. Realistic expectations go some way towards lessening the negative impact that cultural differences may have on soldiers.

4.5 Psychological Operations and Civil-Military Liaison

Conduct of psychological operations (PSYOPS) is part of command and control warfare and should be a major part of urban operations. PSYOPS have the potential to damage the enemy's (or friendly forces when used by the enemy) command and control system by lowering morale, instilling fear and fostering distrust. External stimuli, which bear directly on an individual's value system or physical wellbeing, are of particular significance to PSYOPS. Impact can often produce temporary emotional and behavioural responses which over-ride pre-existing attitudes and behavioural patterns. Resistance to enemy PSYOPS is best countered by having well trained, led, equipped and cohesive teams of soldiers who believe that they are part of a just operation.

PSYOPS tactics are important when mounting an operation against an enemy force and also when used with non-combatants. Different plans are usually required for each target category. A key indicator of the nature of PSYOPS is the degree of support for enemy combat elements that is provided by the non-combatant population. The residents of an urban area are generally a very important resource. A primary focus of PSYOPS and of civil affairs must be to separate the enemy combat elements from the base that provides support. Because of a probable large number of non-combatants, it is particularly important to consider the benefits that can be obtained from PSYOPS and Civil-Military Liaison plans developed specifically to minimise non-combatant casualties and maximise non-combatant assistance to the friendly force. A lesson from East Timor [CAL 2001] is that all soldiers need to be aware of the non-military aspects of peacekeeping so that they can deal adequately with the civil population. This should apply equally to non-peacekeeping operations.

4.6 Physical Environment

The physical environment is always a source of stress, be it darkness, cold, wet, wind, noise, heat or excessive exposure to the sun [ADFP 714]. In urban operations, the nature of urban terrain should be added, with its limited visibility and multi-dimensional nature (horizontal, vertical including subterranean and from above). Taller buildings, even if of only two or three storeys, have many adverse influences on soldier confidence and therefore on combat performance. The physical nature of the terrain adds uncertainty about the enemy location, who is the enemy and who is friendly. Combat becomes more close range fighting, short notice contacts, with some weapons not proving as useful as previously experienced. Perhaps artillery and tanks cannot perform as expected due to barrel depression or elevation limitations. There may be difficulty in protecting tanks from

tank killer teams, and air support may be more difficult to coordinate because of communications limitations and navigation, target acquisition and flight path difficulties arising from narrow streets and multi-storey buildings.

There is a greatly increased risk of killing non-combatants. The concept of shaping the combat environment is often thought of in terms of firepower. In urban warfare, large volumes of high penetration fire may prove counter-productive. It may be more important to use less lethal, more versatile, or more specific weapons which soldiers can feel confident will help protect them and eliminate enemy with less risk to non-combatants and to urban infrastructure. Soldiers will be more effective (less stressed and more confident) if they feel that they have knowledge of structures, materials and the effects of various munitions on these to minimise collateral damage. Situational awareness has always been critical to effective combat performance, but the physical nature of the urban environment, village, town, or city, perhaps requires new ways of sensing about this different battle space.

4.7 Cultural Environment

When tasked with conducting urban operations most soldiers probably think of buildings (villages, towns, or cities) and of factors of the physical environment. These are important because they influence the manoeuvre, fire support, logistics, protection and command and control that are normally considered when planning military operations. The general tendency could be to believe that combat would be more difficult in a highly structured, high rise urban environment. However, physical complexity may not always be the only factor, or even the primary one that must be considered. Cultural complexity may be as significant an environment as physical complexity. The US forces eventually won the battle for Hue City, but they never did win the battle for the more primitive city of Mogadishu. The physical characteristics of the targeted city are important, but so may be the social structure and associated cultural characteristics.

The US experience in Beirut and Mogadishu [Akers and Singleton 2000, Hall 1997, Peters 2000] and the Russian experience in Grozny [Grau and Thomas 2000] demonstrate that misunderstanding the cultural architecture of an urban environment can have severe negative consequences. Chechnya and Somalia were societies run by the tribal or clan system. In failing to understand this deeply embedded cultural system the Russian and US forces failed to learn to know their opponents and were frequently 'wrong-footed' by them. The Chechen example is particularly noteworthy because the Russians understood that it was a clan system that they dealt with, but they nevertheless stereotyped the clan structure on their historical understanding and completely misunderstood the Chechen urban cultural environment of the 1990s [Lievan 2001]. Rather than traditional clan loyalty providing the threads of allegiances and the structure of power and command, the Chechen true affiliation and fighting structure was based on uniting against a common foe (Russia), loyalty to the extended family, and in some cases to criminal groups. Misunderstanding an opponent's true affiliation and command structure is a weakness that can lead to unexpected and severe consequences through poor decision making.

Military planners must take care to avoid overlaying their own value set, religion, culture and thought processes onto an enemy commander or enemy force when trying to anticipate enemy actions or responses. The social sub-system is a complex interwoven network of factors that powerfully defines the urban groups and indicates potential behaviour during urban operations. Planners should collect intelligence on the population's attitudes and allegiances, and weave these into their military plans, psychological operations and civil affairs programs.

4.8 Equipment

Operators of high technology military equipment will face stresses particular to their own equipment and the environment in which they are operating. They may be subjected to overload due to working at high intensity for extended periods of time. In most cases they will be subject to close scrutiny from superiors who are relying on information provided through use of the equipment (e.g. communications, reconnaissance, surveillance) to both direct the operation and to satisfy the information needs of higher commanders. These soldiers may also be the people to first perceive that their unit is at or near a decisive point in the operation, while they also have command, control and communications difficulties to higher command. Because of their role, C4ISR[1] assets may also be the principal focus of the enemy's main effort.

Equipment (even camouflage) may not function as effectively in the urban environment as soldiers expected from non-urban operations. Some equipment operators (especially communication, surveillance and reconnaissance) may be frustrated if the enemy does not use high technology communications and radar, because some high technology equipment will be of little utility to the C4ISR system if the enemy provides no signature. There will be the frustration of having sophisticated equipment breakdown at inopportune moments with no parts or personnel available to rectify the problem. While equipment breakdown may be a normal part of operations, logistic support is possibly more difficult at the tactical level in urban operations, resulting in equipment not being repaired or replaced during combat operations. Equipment breakdown can reduce combat effectiveness because it is not available for the task. It can also lower morale by lowering confidence in combat equipment generally and possibly through reduced situation awareness and coordination of actions, and increased feelings of isolation.

The nature of the urban environment and urban conflict will require highly mobile teams, often section, half-section or smaller, with the personal agility and strength to manoeuvre quickly through windows, doors and holes in buildings, onto roofs and down into sewers. Over the past decade the tendency has been for technological developments to lead to an increase in the wearing of body armour, as well as to provide a range of new weapons and other equipment very useful to soldiers in urban conflict. One challenge will be to balance the mix of personal protection, lethal and non-lethal weapons, break-and-enter and night fighting equipment available with the physical, psychological and logistical demands of

[1] command, control, communications, computing, intelligence, surveillance and reconnaissance

safely securing and holding terrain such as buildings, freeways, parklands and sewers. Discussion on non-combatants has already raised the issue of less lethal, more specific weapons to provide more control over damage to infrastructure and non-combatant casualties. Further discussion occurs in Section 4.10, *Non-Lethal Weapons*. Any development of remotely controlled air and ground vehicles and equipment that permits the operational task to be accomplished with minimal risk to soldiers should be pursued. Some 'low tech' weapons such as ladders and scaling ropes are probably also worth consideration, but are more a matter for operational forces to determine.

4.9 Rules of Engagement/Status of Forces Agreement

The military purpose of Rules of Engagement (ROE) is mission accomplishment. ROE should not interfere with the political or operational objectives of the operation, but they should give soldiers confidence that they know what a superior requires in any situation likely to be encountered. Soldiers should be confident that they can protect themselves and that the ROE does not impede their judgement. It should be clear to soldiers how the ROE relate to the laws of the country. ROE (and the Status of Forces Agreement (SOFA)) are particularly vulnerable to failing soldiers needs when 'mission creep' occurs, that is, when the tasks allotted to soldiers change from those originally forecast and the ROE/SOFA are not critically reviewed.

ROE are of particular concern in an urban environment where it may be difficult to separate non-combatants from the opposing force, and where enemy may deliberately attempt to confuse or entrap soldiers into errors which aid enemy objectives. ROE must provide guidance on action to deal with hostile crowds and on enemy use of non-combatants. Guidance on dealing with looting and other crimes that are normally civil offences may be required. Two examples of failure of ROE to provide clear guidance in dealing with crowds and non-combatants were the US Marine Corps operation in Beirut, Lebanon [Hall 1997] and the US Marine Corps and US Rangers in Mogadishu, Somalia [Akers and Singleton 2000, Grau and Kipp 1999, Hall 1997]. In Beirut and Mogadishu militia forces exploited ROE to attack US personnel.

The US Marine Corps operation in Beirut (1982-1984) could be best described as a mission to present a stabilising force for the locals, but that was a vague mission which made it difficult to articulate coherent ROE. Essentially, marines were prohibited from using their weapons without specific command authorisation except in situations of self-defence. Marines interpreted the ROE to mean that they had to 'take the first hit'. In addition, there was considerable mission shift, and change in ROE, with different ROE applicable to different sectors. Personnel performed duty in several of these sectors contributing to the confusion. The apparent US Government failure to understand the nature of the war and the cultural imperatives at work left the marines vulnerable and with ROE in which they lacked confidence and felt unable to do what was needed [Hall 1997]. Lebanese militia exploited the ROE to openly taunt the Marines. Finally, 241 Americans died in the vehicle bomb attack at their Beirut Airport site and the US forces were withdrawn from Lebanon without the mission being accomplished.

Ten years later, with US involvement in the UNITAF mission in Somalia, it appeared that ROE were clear and gave the local commander the flexibility to make necessary decisions. The US mission under UNITAF appeared accomplished. Subsequently, as the mission changed under UNOSOM II and militia action and media opinion led to changes in ROE, the mission again failed, in part because of multiple ROE which led to confusion among marines and permitted militia forces to gain the ascendancy [Hall 1997]. The US forces withdrew. A passage from *Black Hawk Down* is indicative of the kind of situation with which US soldiers had to cope and for which confusion regarding ROE meant they were not prepared: 'The US Rangers saw a Somali with a gun lying prone on the street between 2 kneeling women. The shooter had a barrel of his weapon between the women's (sic) legs and there were 4 children actually sitting on him. He was completely shielded in non-combatants, taking full cynical advantage of the Americans' decency.' [Bowden 1999 p. 46].

ROE are a further concern in coalition operations where it is necessary to try to ensure clear agreement on common intent and develop confidence that coalition partners will provide expected support. Even having agreed definitions of ROE terminology may not always lead to the expected actions by coalition partners because of partisan national interests and national chains of command that may parallel coalition chains of command. Furthermore, it is the soldiers' perceptions of clarity, fairness and coalition support that remain significant, as much as the reality. In Rwanda, Australian soldiers reported (to the author) that they trusted the Zambian Army contingent to provide expected support but did not always trust some other nations' contingents. The Australian deployment in East Timor demonstrated the need to have appropriate ROE written by operations staff, consistent with the tactics to be employed. It also demonstrated the need to have the time to conduct situation-specific training, applying the ROE in the type of tactical scenarios likely to be encountered [CAL 2001].

Apart from ROE, the SOFA may also be significant to soldiers. This may not be so in a Gulf War level of operation, but it will certainly matter in the normal peacekeeping and peace enforcement operation where the law and jurisdiction of the host nation are not displaced by coalition military law. Soldiers should clearly understand their responsibilities and their rights under the SOFA.

4.10 Non-Lethal Weapons

Non-lethal weapons are already extensively used through psychological operations, information warfare and electronic warfare. Non-lethal warfare in this paper refers particularly to the tactical and perhaps the operational level of warfare, and not to the strategic level. Non-lethal weapons systems in this context are ones designed to incapacitate personnel and materiel rather than be lethal and damaging to property and the environment.

The development and employment of non-lethal weapons could be a boon to urban warfare because of the perception that mass destruction and death and injury to non-combatants would be minimised. A nation using non-lethal weapons could demonstrate a high moral position and strong commitment to life. Their availability could permit a commander to intervene in some situations at an earlier and less dangerous stage than if his options were the dichotomy of either taking no action or using potentially lethal force. Under these circumstances the psychological climate of urban operations could be far less damaging than would otherwise be the case. This could be so, but apart from the technical aspects of developing, manufacturing, equipping, maintaining and training associated with provision of these weapons, there are also some operational usage problems that need to be addressed.

Not all 'non-lethal' weapons are necessarily non-lethal regardless of circumstances. Some deaths may still result. For example, rubber bullets may still be lethal or capable of serious injury, depending on the targets' range and on clothing worn. For other products, the health of the target may also be significant. Non-lethal weapons may certainly be non-lethal or only occasionally lethal, and are preferable in some circumstances to lethal weapons.

It is difficult to see that the development of non-lethal weapons, at least in the foreseeable future, will eliminate the need to always permit deadly force as an option under ROE. Under these circumstances, non-lethal weapons extend the range of options available to a commander when dealing with urban operations. In reality this creates a continuum or single dimension ranging from 'no action' through 'use non-lethal weapons' to 'use lethal weapons'. This has the potential to create problems for the soldier on the ground.

When should a lethal option replace a non-lethal one? If ever a soldier uses a lethal option there remains the likelihood that someone, enemy, media or own force, will believe that the non-lethal option should have been chosen. The soldier may also have those doubts. The formulation of ROE again becomes critical to a soldier's wellbeing and combat effectiveness, and to mission accomplishment. The introduction of non-lethal weapons into the US forces withdrawal from UNOSOM II in Somalia required adjustment to the ROE. The authorities appear to have been aware of the need to clearly distinguish the circumstances, and of the potential for misunderstanding. The ROE subsequently written for this early introduction of non-lethal weapons into a military force were so restrictive on non-lethal weapons usage that they were, for all practical purposes, only available for use where lethal force had previously been permitted [Hall 1997].

4.11 Medical Support

A medical plan is a normal part of planning for operations and a strong factor in friendly force morale. There are some factors that require specific attention for urban warfare. This section does not purport to provide guidance for medical staff who will use their own specialist expertise. The section does attempt to cover the main issues that operational

planners should consider from the viewpoint of soldiers and their psychological wellbeing.

Urban warfare kills and injures people and damages urban terrain and urban facilities. Casualty rates have traditionally been high. Planning should consider infrastructure that is likely to be damaged and what friendly force support may be required to alleviate problems, such as disease from contaminated water and damaged sewerage systems, hospitals that are damaged or no longer adequately staffed, or food supply networks that cease to operate. While a friendly force may be able to support its own forces, it may also be expected, by the local population, NGO, UN or other nations, to also provide medical support for others. These 'others' may include the local population of non-combatants, NGO, UN or coalition forces, and non-blue force combatants. Failure to do so may have not only political ramifications, but also may damage the morale, cohesion and operational effectiveness of the friendly force – in accord with the aforementioned mass destruction and human misery aspect of warfare and operational stress. Some recent Australian operations have not planned to provide medical support outside their own forces, or outside UN or coalition forces, yet have encountered the need to provide much more extensive medical support. Providing medical support that was not expected in the planning stages risks reducing support to Australian forces.

Fear of death and fear of wounding is the soldier's universal concern. Confidence in the rapid availability of medical support is essential to high morale and effective combat performance. Medical support may be disrupted by the nature of the urban terrain. Are the medical personnel equipped and trained to move in vehicles and on foot through urban terrain, and is adequate security provided? Can the wounded be located and given initial treatment at sub-unit level, and can they be located and evacuated to higher echelon facilities as required, especially if aero-medical evacuation is not possible in the urban environment? Soldiers will be required to provide medical support for their own forces, enemy forces, and almost certainly for non-combatants. Combat soldiers need a set of medical ROE to guide their responses to opposing force and civilian wounded. Similar ROE should be issued for the medical support force, and should include guidance on working relationships with NGO and local staff and use of local facilities.

Language and culture are also two key issues for medical support staff, just as for others in the force. If the operation is a coalition one, or when they need to deal with or treat the local population, medical personnel require either foreign language skills of their own, or to have translators to assist them [CAL 2001]. Briefing on cultural factors should have been already covered for medical personnel when provided for other members of the friendly force before deployment.

5. Conclusion

Historically, commanders have usually preferred to avoid fighting in urban areas. When urban warfare has been waged, the outcome has usually been attrition warfare with high casualties for combatants on both sides, and for non-combatants. Massive destruction of the urban environment, infrastructure and social structure has also occurred. Nations are becoming increasingly urbanised, and urban centres are increasingly seen as centres of gravity by both sides in any conflict.

Centres of gravity are significant military objectives for offensive force commanders, and can be significant combat multipliers for defensive force commanders. Armed forces have realised that urban operations require detailed consideration as a specific style of combat, otherwise high technology forces may continue to be defeated, or at least severely mauled, by relatively low technology forces that are prepared to adapt their defences and equipment to urban operations. This paper has outlined the key human considerations that affect combat performance and combat force preservation in urban operations. These factors need to be considered as part of developing an urban operations combat system. While the principles are universal, many of the specifics of these human factors will depend on operational considerations and specific tactics and equipment selected as part of the urban operations system.

In any form of warfare the single most important factor is the human will to fight – to risk your life, to kill other human beings, and to direct others who kill. This will must be created, and it must be maintained through sustained periods of intense combat in what is usually a chaotic environment. In urban operations the nature of the environment is different, and the chaos may be typified by large-scale destruction of the man-made environment, and by high casualty rates to both sides and to non-combatants. A commander who elects to fight in a village, town or city has made a decision to accept destruction of the urban environment, and high non-combatant casualties, unless the non-combatants have fled. There may be a significant IDP problem to be managed. For the attacker and defender alike, rest, reinforcement, rotation, and re-supply may be difficult.

In developing a combat system for urban operations, there is a need to review equipment scales and to develop and purchase different equipment. This can probably be categorised into the accepted basic categories of communication, engagement, movement, navigation, protection and surveillance. However, maintenance of the human will to fight depends most on training in basic soldier skills and skills to use the equipment available, and on leadership, self-discipline and teamwork all practiced within an urban operating environment. The acquisition of new technology and equipment is important but secondary.

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This paper outlines the key human factors issues associated with urban operations. It first describes the urban operations environment from the commanders' and soldiers' perspective. It then uses their perspectives to identify the human factors which should be considered in the development of a system for conducting urban operations.

The urban environment is characterised as comprising three subsystems, physical, functional and social, and discussion of the issues that influence human performance in urban warfare is structured around well established principles of human performance in combat, but relates these to the anticipated specific nature of urban warfare.