

**From Space to Street Corners:
Global South Cities and US Military Technophilia**

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ABSTRACT

This article seeks to open up to critical scrutiny the attempts currently being made to re-engineer post-Cold War US military power to directly confront global south urbanization. Through analysing the discourses produced by US military commentators about 'urban warfare,' and the purported military and technological solutions that might allow US forces to dominate and control global south cities in the future, the paper demonstrates that such environments are being widely essentialised as spaces which necessarily work to undermine the United States' military's high-technology systems for surveillance, reconnaissance and targeting. The paper shows how, amid the on-going urban insurgency in Iraq, widescale efforts are being made to 'urbanise' these military systems so that US military forces can attempt to assert high-tech dominance over the fine-grained geographies of global south cities in the future.

INTRODUCTION

“For Western military forces, asymmetric warfare in urban areas will be the greatest challenge of this century [...]. The city will be the strategic high ground – whoever controls it will dictate the course of future events in the world” (Dickson, 2002a, 10)

Western military theorists and researchers are increasingly preoccupied with how the geographies of global south cities, and processes of global south urbanisation, are beginning to influence both the geopolitics and the techno-science of post Cold-war political violence. Indeed, almost unnoticed within ‘civil’ urban geography and social science, a large ‘shadow’ system of military urban research is quickly being established. Funded by Western military research budgets, this is quickly elaborating how such effects are allegedly already becoming manifest, and how the global intensification of processes of urbanisation will deepen them in the future (Graham, 2004a).

Fuelled by the growing realisation that the scale and significance of contemporary processes of urbanisation across the world might significantly reshape the geopolitics, doctrine and realities of post Cold War Western military strategy, such research fuels a crucial set of techno-military discourses. Within and through these, attempts are currently being made to reconstitute the

structure, orientation and techno-science of western military power to directly reflect the alleged implications of such urbanisation.

The central consensus amongst the wide variety of western military theorists pushing for such shifts is that “modern urban combat operations will become one of the primary challenges of the 21st century” (DIRC, 1997, 11). Major Kelly Houlgate (2004), a US Marine Corps commentator, notes already that, “of 26 conflicts fought over [by US forces] between 1984 and 2004, “21 have involved urban areas, and 10 have been exclusively urban”.

The widening adoption of ‘urban warfare’ doctrine follows centuries when Western military planners preached Sun Tzu’s mantra from 1500 BC that the “worst policy is to attack cities”. It follows a post World War II Cold War period marked by an obsession with mass, superpower-led ‘Air-Land’ engagements centred on the North European plain within and above the spaces between *bypassed* European city-regions. Whilst numerous wars were fought by western forces in developing world cities during the Cold war, as part of wider struggles against independence and terrorist movements and the ‘hot’ proxy wars, such conflicts were very much seen by western military theorists as unusual side-shows to the imagined superpower ‘Air-Land’ and nuclear engagements (Davis, 2004a). Consequently, the doctrine of ‘urban warfare,’ already marginal, received very little attention during the Cold War and became even more marginalised within Western military rhetoric (Hills, 2004). On the rare occasions when urban

warfare was specifically addressed in Cold War military doctrine, United State's forces, in the euphemistic language so typical of military forces, tended to "approach the urban area by rubbleing or isolating the city" using tactics unchanged since World War II (Grubs, 2003, iii). That is, they either ignored, or sought to systematically annihilate, urban places (as at Hue during the Vietnam war).

In the place of such neglect of western military doctrine which specifically addresses the challenges of counter-insurgency warfare within cities, a highly contested, diverse and complex set of institutional and techno-scientific battles are now emerging through which attempts are being made to try and re-imagine and reshape Western military forces so that counterinsurgency operations within large urban areas become their *de facto* operations (Hills, 2004). Prevailing conceptions of Western military engagement are thus being widely challenged to address the perceived perils of engaging in 'military operations on urban terrain' (or 'MOUT').

As the world's pre-eminent military power, the military forces of the United States provide the most interesting and important example of how discursive constructions of 'urban terrain' are being used to justify attempts at the 'transformation' of the technologies, tactics and strategies of national military intervention more broadly (see Ek, 2000). US military research on 'urban operations' dwarfs that of all other nations combined (Hills, 2004). The bloody

experience of the Iraq urban insurgency is already looming large in these debates. A major review of the imperative of urban warfare 'doctrine' for US forces, prepared by Major Lee Grubbs in 2003, for example, stated baldly that "as the Iraq plan evolves, it is clear that the enemies of the United State's military have learned a method to mitigate the Joint [US] Force's dominance in long range surveillance and engagement. The enemy will seek the city and the advantages of mixing with non-combatants" (2003, 56).

One particularly important feature of US military discourses on urbanisation looms large in such debates. This is the way in which the sheer three-dimensional complexity and scale of global south cities allegedly undermine the United State's expensively assembled and hegemonic advantages in surveillance, targeting and killing through 'precise' air and space-based weapons systems (Graham, 2003, Davis, 2004b).

In such a context, this article seeks to analyse critically the ways in which processes of urbanisation are currently being imagined by US military theorists to significantly undermine the military and techno-scientific dominance of the US military in a rapidly urbanising world. The article is motivated by the argument that the processes through which US military planners imagine, and discursively construct, global south cities as their predominant 'battlespace' for the early 21st century, demands critical social scientific scrutiny. The article falls in to three parts. In the first, discursive problematisation of global south cities produced by

US military urban researchers and commentators are reviewed. Emphasis is placed on how developing world cities are depicted as intrinsically labyrinthine, chaotic, structureless and deceptive environments which substantially frustrate the wider US geopolitical strategy based on the US military's advantages in air and space-based surveillance, digital processing, and 'network-centric' warfare – transformations which, together, are sometimes labelled the 'Revolution in Military affairs' or 'RMA' (Gregory, 2004).

The second part of the paper goes on to analyse the way in which key actors within the US military-industrial complex are suggesting deeply technophilic 'solutions' to this purported erosion of US geostrategic power through global south urbanisation. Here what I call the 'urban turn' of the of the RMA – the shift in technophilic discourses from discussions of planet-straddling weapons systems to technological innovations designed to allow the micro-spaces of developing world 'megacities' to be controlled -- is analysed in detail. Centred on the concept of 'persistent area dominance,' such strategies entail the saturation of 'adversary' cities with large numbers of miniature surveillance and targeting systems. These are being designed to support continuous targeting, and destruction, of detected 'targets'. The final part of the paper draws brief theoretical and research conclusions of the preceding discussions.

DREAMS FRUSTRATED? URBANISATION AND THE 'REVOLUTION IN MILITARY AFFAIRS' (RMA)

“Urban operations represent a black hole in the current Revolution in Military Affairs pantheon of technological advantage [...]. The technologies traditionally ascribed to the current Revolution in Military Affairs phenomenon will have negligible impact on Military Operations in Urban Terrain” (Harris, 2003, 38-41)

The military strategies to project, sustain and deepen US geopolitical power in the post Cold war period (see Roberts et al, 2003, Kirsch, 2003, Barnett, 2004) rest on the exploitation of a ‘transformation’ of US military power through what has been termed a “Revolution in Military Affairs’ (see Ek, 2000, Pieterse, 2004). Centring on the technologies of ‘stealth,’ ‘precision’ targeting, and satellite geo-positioning, the RMA has widely been hailed amongst U.S. military planners as the means to sustain US dominance in the post Cold War world (Stone, 2004).

Central to the RMA is the notion that “military operations are now aimed at defined effects rather than attrition of enemy forces or occupation of ground” (Cohen, 2004, 395). Through the interlinkage of the ‘system of systems’ of U.S. military technologies, RMA theorists argue that a truly ‘network centric warfare’ is now possible through which US forces can continually dominate societies deemed to be their adversaries through their increasingly omnipotent

surveillance and 'situational awareness', devastating and precisely-targeted aerial firepower, and the suppression and degradation of the communications and fighting ability of any opposing forces (Arquilla and Ronfeldt, 2001, Graham, 2005). Thus, RMA theorists imagine US military operations to be a giant, integrated, 'network enterprise' – a 'just-in-time' system of posthuman, cyborgorganised warriors which utilises many of the principles of logistics chain management and new-technology based tracking that are so dominant within contemporary management models (Gray, 2003).

Importantly, however, such technophilic discourses depicting an RMA ushering new relatively reduced-risk, 'clean' and painless strategy of US military dominance assumed that the vast networks of sensors and weapons that needed to be integrated and connected to project US power would work *uninterruptedly*. Global scales of flow and connection have thus dominated RMA discourses; technological mastery, omnipotent surveillance, real-time 'situational awareness', and speed-of-light digital interactions, have been widely portrayed as processes which, intrinsically, would usher in US military 'Full Spectrum Dominance', on a planetary scale, irrespective of the geographical terrain that was to be dominated.

RMA discourses have, in this sense, been notably ageographical. Crucially, from the point of view of the current paper, little account was taken of the geographical specificities of the spaces or geographical terrains inhabited by the purported

adversaries of the US in the post Cold War period (or how they are changing through processes of urbanisation and globalisation). A key axiom of RMA rhetoric has been the idea that the US was now able to prosecute its global strategies for geopolitical dominance through a “radical non-territoriality” (Duffield, 2002, 158).

In response to this neglect of global urbanisation within RMA discourses, and spurred on by the catastrophic and ongoing urban insurgency since the US-UK invasion of Iraq in 2003, an increasingly powerful range of counter-discourses have emerged within the US military. Through these a second group of US military theorists have asserted that the technophilic dreams of RMA will either fail, or be substantially undermined, by global processes of urbanisation, especially in the global south cities where they imagine US forces being most often engaged. The pronouncements of those advocating an ‘urban turn’ in the RMA have had two main features.

Signal Failures: Urban Environments as Physical

Interrupters to ‘Network-Centric Warfare’

“In simple terms walls tend to get in the way of today’s battlefield communications and sensor technologies” (Hewish and Pengelley, 2001)

Their first major feature has been the strong suggestion that the urban terrain in poor, global south countries is a great leveller between high-tech US forces and their low-tech and usually informally organised and poorly equipped adversaries (Gregory, 2004, Graham, 2004b). The complex and congested terrain below, within, and above cities is seen here as a set of physical spaces which limit the effectiveness of high-tech space-targeted bombs, surveillance systems, and automated, 'network-centric' and 'precision' weapons. The U.S. defence research agency, DIRC, for example, argue that "the urban environment negates the abilities of present US military communications equipment" resulting in dead spots, noise, signal absorption, propagation problems which severely undermine the principles and technologies of 'network-centric warfare'" (DIRC, 1997).

The architects Misselwitz and Weizman are amongst the very small number of critical urban researchers who have addressed the ways in which urbanisation undermines the technologies produced by the RMA. They conclude that, within contemporary cities:

"high-tech military equipment is easily incapacitated. Buildings mask targets and create urban canyons, which diminish the capabilities of the air force. It is hard to see into the urban battlespace; it is very difficult to communicate in it, because radio waves are often disturbed. It is hard to use precision weapons because it is difficult to obtain accurate GPS satellite locations. And it becomes more and more difficult (but not impossible) for the military to shoot indiscriminately

into the city. For all these reasons, cities continue to reduce the advantages of a technologically superior force” (Misselwitz and Weizman, 2003, 8).

The ‘urbanisation of battlespace’ is therefore seen by US urban warfare commentators to reduce the ability of U.S. forces to fight and kill at a distance (always the preferred way because of their ‘casualty dread’ and technological supremacy). Cities are therefore seen to produce rapidly escalated risks for US forces fighting pre-emptive, expeditionary wars. “From refugee flows to dense urban geography, cities create environments that increase uncertainty exponentially” (DIRC, 1997). Military operations in cities are therefore seen as treacherous Trojan horse-style events which might allow weak and poorly equipped insurgents to gain victory of the world’s remaining military superpower (Glenn et al, 2001).

The ‘Urbanisation of Insurgency’:

Global South Cities as Refuges From US Vertical Power

“Opposition forces will camouflage themselves in the background noise of the urban environment. Within the urban environment, it is not the weapon itself rather the city which maximises or mutes an arm’s effectiveness” (DIRC 1997, 11)

A second main feature of US urban warfare discourses is that the breaking down of high technology sensors and weapons, because of the physical morphology of cities, will directly and causally lead to an increasing tendency amongst the United States's political adversaries to take refuge within cities. "The long term trend in open-area combat", writes the leading U.S. 'urban warfare' commentator, Ralph Peters (1996, 6), "is toward overhead dominance by US forces." As a result, he predicts that "Battlefield awareness [for US forces] may prove so complete, and 'precision' weapons so widely available and effective, that enemy ground-based combat systems will not be able to survive in the deserts, plains, and fields that have seen so many of history's main battles."

As a result, Peters argues that the United States' "enemies will be forced into cities and other complex terrain, such as industrial developments and inter-city sprawl" (1997, 4). Grau and Kipp, (1999 4), concur, suggesting that:

"urban combat is increasingly likely, since high-precision weapons threaten operational and tactical manoeuvre in open terrain. Commanders who lack sufficient high-precision weapons will find cities appealing terrain [...], provided they know the city better than their opponent does and can mobilize the city's resources and population to their purposes."

Central to this perception of the incentives underlying what RAND theorists, Taw and Hoffman (2000), have termed the 'urbanisation of insurgency,' is the notion

that insurgents exploiting the physical geographies of global south cities can force US military personnel to come into very close physical proximity and so expose US politicians to much higher casualty rates than stipulated within RMA doctrine. DIRC argue that:

“The weapons [such insurgents] use may be 30 to 40 years old or built from hardware supplies, but at close range many of their inefficiencies are negated. The most effective weapon only needs to exploit the vulnerabilities that the urban environment creates. Each new city will create a different pool of resources and thereby create different urban threats” (DIRC, 1997, 8).

Here, the obvious limits of attempting to understand the complex geographies of cities through the verticalised surveillance systems emphasised by the RMA are a major bone of contention amongst those promulgating the counter discourses emphasising the urbanisation of insurgency. A common tendency here is to naturalise and essentialise the complex physical and social geographies of global south cities as ‘jungle’-like environments, in which small insurgent groups gain political and financial support from the wider population, that necessitate new techniques to ensure the ‘cleansing’ of the city (Glenn, 1998). As is very common in US military and political literature on the threats of future urban insurgencies (see Norton, 2003), the DIRC report emphasises that informal and favela districts in global south cities add great power to the strategies of

insurgent and criminal groups utilising the classic techniques of guerilla and 'asymmetric' warfare against potential US or western incursion. It argues that:

“the shanty sprawl of the developing city frequently allows insurgents to adapt their rural strategy more effectively to an urban environment. Asymmetric forces have the same benefits and advantages that have traditionally been enjoyed in the jungle of forest base: control over territory, allegiance (whether voluntary or coerced) of much of a country's population, inaccessibility to security forces. The urban environment adds reasonably secure bases for operations around the heart of government and its administrative and commercial infrastructure [...]. The urban geography of slums favors the tactics of an unconventional force. [...] Guerilla campaigns need not be overall military urban success, but rather need only to make the opposition's campaigns appear unpalatable to its domestic support. Urban warfare favors the media age” (DIRC, 1997, 6)

DREAMS RECLAIMED? FROM PREEMPTIVE WAR TO 'PERSISTENT AREA DOMINANCE'?

“The time has come to change the perception that the high-tech US war machine fights at a disadvantage in urban areas” (Houlgate, 2004).

“Urban areas should become our preferred medium for fighting. We should optimize our force structure for it, rather than relegating it to Appendix Q in our fighting doctrine, treating it as the exception rather than the norm [...]. It is time to tell Sun Tzu to sit down [...]. Instead of fearing it, we must own the city” (sic.) Lt. Col. Leonhard, US Army (2003)

With the widespread perception that the intensifying urbanisation of the parts of the global south that the US military envisage being their dominant areas of operation is radically undermining their broader efforts at techno-scientific transformation, a wide range of projects and initiatives are emerging aimed at specifically tailoring the ‘RMA’ to the specific geographies of urban areas in the global south. With the urban insurgency in Iraq as an on-going fulcrum war, a ‘transformation’ based on the technophilic celebrations of the death of geography through new technologies is, ironically, being transformed into a major techno-scientific effort to develop and experiment with surveillance, communications and targeting systems that are specifically tailored to the fine-grain physical and human geographies of global south cities.

It is now widely argued within US military strategic organisations and think-tanks that the RMA needs to be reconfigured to address the challenges of tightly built global south cities; that new bodies of ‘urban’ research need to be built up to understand how to use military violence to deliver precise ‘effects’ in such cities; and that the doctrine, weaponry, training and equipment of US forces need to be

comprehensively redesigned so that urban military operations are their de facto function. Major Lee Grubbs (2003, iii-5) of the US Army argues that U.S. forces need to be redefined so that their main purpose is to “create operational shock in the urban environment.” This requires, he argues, a deep understanding of the battlespace to identify causality between critical point, action, and effect achieved.” In turn, Grubbs suggests that “Operational design and a process for understanding the city becomes critical for the selection of critical points to destroy, control and influence [...]. The challenge is the development of an executable operational concept for achieving systematic, across the entire system, effects within the urban environment through the selective use of force” (ibid.)

A large output of conceptual, techno-scientific and Research and Development material has been created by the ‘urban turn’ of the RMA, especially since the Iraq invasion (see Grubbs, 2003, Houlgate, 2004). The overwhelming rhetoric in such efforts emphasises that new military techno-science, specifically developed to address cities, will turn global south urban environments into areas that US forces can completely dominate, using their technological advantages, with minimum casualties to themselves. New weapons and sensor programmes, specifically designed to enhance the ability of future US forces to control and dominate global south cities through network-centric means, are already emerging from the wider efforts at physical and electronic simulation, wargaming, and the evaluation of the experience of the Iraq insurgency. These centre, first,

on unveiling global south cities through new sensor technologies, and, second, on developing automated and robotic weapon systems linked to such sensors.

Technophilic Unveilings of Global South Cities:

Dreams of 'Real-Time Situational Awareness'

The first key effort to redirect the RMA to the purported challenges of US forces attempting to dominate and control global south cities involve programmes designed to saturate such cities with myriads of networked surveillance systems. The dream of US military theorists is that this can be done to such an extent that any identified target can be automatically identified at any time and so exposed to high-technology tracking and killing powers of 'network-centric' weapons. Such visions imagine pervasive and interlined arrays of 'loitering' and 'embedded' sensors as overcoming all the limits and interruptions that megacity environments place in the way of successfully implementing networks centric warfare. Ackerman (2002), for example, suggests that such sensor suites will be designed to automatically trace dynamic change rather than constantly soaking up data from unchanging environments: observing 'change' rather than observing 'scenery', as he puts it. In other words, algorithms will be designed to only function when definable changes occur. They will thus identify purported notions of 'normality' against the 'abnormal' behaviours and patterns that can then be assessed as targets.

One major example of such a development is the tellingly titled 'Combat Zones That See' project led by the US Defense Advanced Research Projects Agency (DARPA). Launched at the start of the Iraq insurgency in 2003, CTS "explores concepts, develops algorithms, and delivers systems for utilising large numbers (1000s) of algorithmic video cameras to provide the close-in sensing demanded for military operations in urban terrain." Through installing computerised CCTV across whole occupied cities, the project organisers envisage that, when deployed, CTS will sustain "motion-pattern analysis across whole city scales", linked to the tracking of massive populations of individualised cars and people through intelligent computer algorithms linked to the recognition of number plates and scanned in human facial photos. "Combat Zones that See", the launch report suggests:

"will produce video understanding algorithms embedded in surveillance systems for automatically monitoring video feeds to generate, for the first time, the reconnaissance, surveillance, and targeting information needed to provide close-in, continuous, always-on support for military operations in urban terrain"

(DARPA, 2003a, 6)

A direct response to the interruptive effects of city environments on older notions of air and space-based network centric warfare, it is envisaged that, once it has been developed by 2007, CTS "will generate, for the first time, the reconnaissance, surveillance and targeting information needed to provide close-

in, continuous, always-on support for military operations in urban terrain” (DARPA, 2003a, 6). It will be designed to specifically address the “inherently three-dimensional nature of urban centres, with large buildings, extensive underground [passageways, and concealment from above” (DARPA, 2003a, 7).

The central challenge of CTS, according to DARPA, will be to build up fully representative data profiles on the ‘normal’ time-space movement patterns of entire subject cities so that algorithms could then use statistical modelling to “determine what is normal and what is not” (quoted in Sniffen, 2003). This will be a purported aid to identifying insurgents’ activities and real or potential attacks, as well as warning of the presence or movement of target or suspect vehicles or individuals. The report states that the CTS project will:

“include [...] analysis of changes in normalcy modes; detection of variances in activity; anomaly detection based on statistical analyses; discovery of links between places, subjects and times of activities; and direct comparison and correlation of track data to other information available to operators. Predictive modelling, plan recognition, and behavior modeling should alert operators to potential force protection risks and hostile situations. Forensic information (where did a vehicle come from, how did it get here?) should be combined and contrasted to more powerful ‘forward-tracking’ capabilities (where could the vehicle go?, where is the vehicle going?) to

allow operators to provide real-time capabilities to assess potential force threats” (DARPA, 2003a, 13).

After a stream of protests from US civil liberties groups, DARPA stressed that, whilst the initial test of mass, urban tracking will take place at a US Army base within the United States (Fort Belvoir, Virginia), the deployment of CTS will only take place in “Foreign urban battlefields” (Defence Watch, 2004).

Saturating occupied or target cities with micro-scale and even nano-scale sensors and cameras is also being investigated by the CTS Programme and an associated programme labelled HURT. Table 1 and Figure 3 show the range of ‘persistent’ and unmanned surveillance platforms currently being considered by DARPA through its CTS and HURT Programmes.

<i>Platform</i>	<i>Payload</i>	<i>Range</i>	<i>Endurance</i>	<i>Sensors</i>	<i>Control</i>
Raven MOUT UAV	0.4 lb	10 km	75 min	One IR or combo of down- and side-looking daylight camera.	GPS autopilot.
PUMA "urbanized" Pointer UAV	2 lb	8 km	120 min	Daylight camera housing; side-look capable.	GPS autopilot.
Matilda ground robot	125 lb	1.5 km	N/A	Modular payload	<u>Teleoperated only.</u>
Dragon Eye UAV	1 lb	4.0 km	60 min	Downward-looking EO/IR.	GPS autopilot.
Maverick UAV	300 lb	200 km	7 hours	Modular payload	SEC asset, variable autonomy
Silver Fox UAV	4 lb	2400 km	24 hours	Downward-looking EO/IR.	GPS autopilot.
OAV (29" version)	20 lb	50 km	90 min	EO/IR downward and slant-angle.	GPS + ?
Yamaha RMAX Autonomous	60 lb	200 km	90 min	Modular payload, inc. new stabilized sensor ball	GPS autopilot.
Predator	450 lb	5500 km	40 hr	EO/IR sensor ball plus SAR, ESM, comms, SIGINT/ELINT	Piloted or GPS waypoints
Fire Scout	200 lb	320 km	6 hrs	EO/IR sensor ball plus SAR, ESM, comms, SIGINT/ELINT	TCS

Table 1 DARPA's table of urban surveillance and weapons platforms under development by its HURT program (Darpa, 2004)(GPS=Global Positioning System, IR=Infrared, OAV=Organic Air Vehicle, UAV= Unmanned Aerial Vehicle)

Urban RSTA requires horizontal viewpoints and rapid reaction to cues and perceived threats

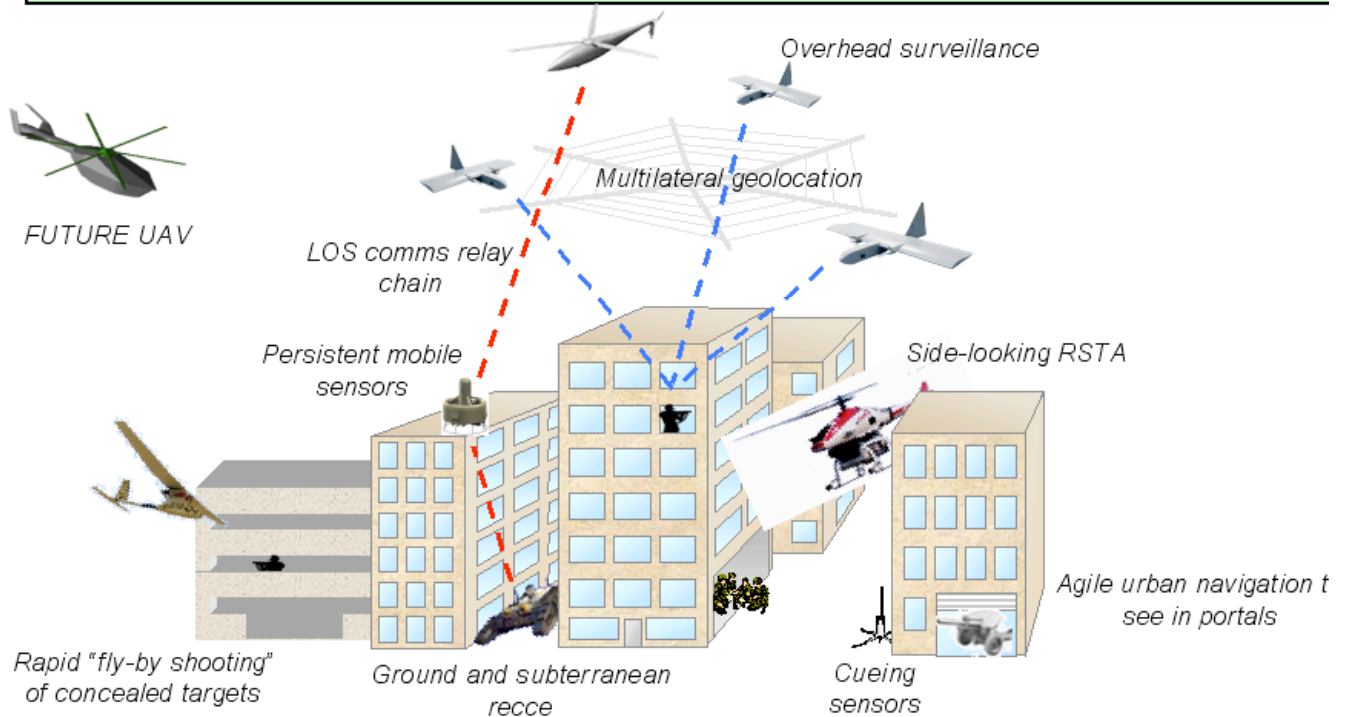


Figure 3 DARPA urban 'Reconnaissance, Surveillance and Target Acquisition' (RSTA) platforms as envisaged by its HURT Programme (Darpa, 2004).(LOS=Line of Sight)

'Persistent Area Dominance':

Towards Robotic Killing Systems in Urban Warfare

The second main area of defence research and development to help assert the dominance of US forces over global south cities focuses on a shift towards robotic air and ground weapons which, when linked to the persistent surveillance and target identification systems just discussed, will be deployed to continually

and automatically destroy purported targets in potentially endless streams of automated killing. The dreams of linking sentient, automated and omnipotent surveillance -- which bring God-like levels of 'situational awareness' to US forces attempting to control intrinsically devious global south megacities -- to automated machines of killing, pervades the discourses of the urban turn in the RMA (see, for example, Huber and Mills, 2001). A telling example comes from the discussion of a model near-future US 'urban operation', described by Defense Watch magazine during its discussions of DARPA's CTS Programme just discussed (2004).

In their scenario, swarms of micro-scale, and nano-scale networked sensors pervade the target city, providing continuous streams of target information to arrays of automated weaponry. Together, these systems produce continuous killing and 'target' destruction: a kind of robotised counter-insurgency operation with US commanders and soldiers doing little but overseeing the cyborganised, interlinked and increasingly automated killing systems from a safe distance. Defense Watch (2004) thus speculate about "a battlefield in the near future" that is wired up with the systems which result from the CTS programme and its followers. Here unbound technophilic dreams of omnipotent urban control blur into long-standing fantasies of cyborganised and robotised warfare. "Several large fans are stationed outside the city limits of an urban target that our [sic] guys need to take", they begin:

“Upon appropriate signal, what appears like a dust cloud emanates from each fan. The cloud is blown into town where it quickly dissipates. After a few minutes of processing by laptop-size processors, a squadron of small, disposable aircraft ascends over the city. The little drones dive into selected areas determined by the initial analysis of data transmitted by the fan-propelled swarm. Where they disperse their nano-payloads.”

“After this, the processors get even more busy”, continues the scenario:

”Within minutes the mobile tactical center have a detailed visual and audio picture of every street and building in the entire city. Every hostile [person] has been identified and located. From this point on, nobody in the city moves without the full and complete knowledge of the mobile tactical center. As blind spots are discovered, they can quickly be covered by additional dispersal of more nano-devices. Unmanned air and ground vehicles can now be vectored directly to selected targets to take them out, one by one. Those enemy combatants clever enough to evade actually being taken out by the unmanned units can then be captured or killed by human elements who are guided directly to their locations, with full and complete knowledge of their individual fortifications and defenses [...]. When the dust settles on competitive bidding for BAA 03-15 [the code number for the ‘Combat Zones That See’ programme], and after the

first prototypes are delivered several years from now, our guys are in for a mind-boggling treat at the expense of the bad guys” (2004, sic.)

Such omnipotence fantasies extend even further to the automated surveillance, through emerging brain scanning techniques, of people’s inner mental attitudes to any U.S. invasion. This allows ‘targets’ deemed to be resistant can be automatically identified and destroyed:

“Robotic systems push deeper into the urban area [...]. Behind the fighters, military police and intelligence personnel process the inhabitants, electronically reading their attitudes toward the intervention and cataloguing them into a database immediately recoverable by every fire team in the city (even individual weapons might be able to read personal signatures, firing immediately upon cueing [...]. Smart munitions track enemy systems and profiled individuals [...]. Satellites monitor the city for any air defense fires, curing immediate responses from near-space orbiting ‘guns’. Drones track inhabitants who have been ‘read’ as potentially hostile and ‘tagged’” (Defense Watch, 2004)

Such dreams of continuous, automated, and robotised urban targeting and killing are far from being limited to the realms of such futuristic speculation, however. Rather, as with the CTS programme, they are fuelling very real multimillion dollar

research and weapons development programmes aimed at developing ground and aerial vehicles which not only navigate and move robotically, but which select and destroy targets without 'humans in the loop' based on algorithmically-driven 'decisions'.

Lawlor (2004), for example, discusses the development of 'autonomous mechanized combatant' air and ground vehicles or 'tactical autonomous combatants' for the US Air Force. These are being designed, he notes, to use "pattern recognition" software for what he calls "time-critical targeting" i.e. linking sensors very quickly to automated weapons so that fleeting 'targets' both within and outside cities can be continually destroyed. Such doctrine is widely termed 'compressing the kill chain' or 'sensor to shooter warfare' in US military parlance (Hebert, 2003). The "swarming of unmanned systems" project team at US forces JOINT Command Experimentation Directorate, based in Suffolk, Virginia, he states, are so advanced in such experimentation that "autonomous, networked and integrated robots may be the norm rather than the exception by 2025".

By that date, Lawlor predicts that "technologies could be developed [...] that would allow machines to sense a report of gunfire in an urban environment to within one meter, triangulating the position of the shooter and return fire within a fraction of a second" providing a completely automated weapon system devoid of human involvement. He quotes Gordon Johnson, the 'Unmanned Effects' team leader for the US Army's 'Project Alpha', as saying of such a system that:

“if it can get within one meter, it’s killed the person who’s firing. So, essentially, what we’re saying is that anyone who would shoot at our forces would die. Before he can drop that weapon and run, he’s probably already dead. Well now, these cowards in Baghdad would have to play with blood and guts every time they shoot at one of our folks. The costs of poker went up significantly [...]. The enemy, are they going to give up blood and guts to kill machines? I’m guessing not” (Herbert, 2003, 3)

Lawlor (2004, 2) predicts that such robo-war systems will “help save lives by taking humans out of harm’s way”. Here, tellingly, only US forces are considered to fall within the category ‘human’.

In addition, unmanned aerial vehicles armed with ‘intelligent munitions’ are already being designed which will, eventually, be programmed to fire on, and kill, ‘targets’ detected by US Force’s real-time surveillance grids, in a completely autonomous way. Such munitions will loiter over targets for days at a time, linked into the data links, until ‘targets’ are detected for destruction (Kenyon, 2004). A programme called TUDLS – or ‘Total Urban Dominance Layered System – for example, is currently underway to provide what Plenge (2004) describes as: “long hover and loiter propulsion systems, multidiscriminant sensors and seekers, mini- and micro-air vehicles, mini-lethal and non-lethal warheads,

autonomous and man-in-the loop control algorithms, and a strong interface with the [urban] battlespace in formation network”

Crucially, such munitions will be equipped with algorithms designed to separate ‘targets’ from ‘non-targets’ automatically. The ultimate goals, according to Pinney, an engineer at Raytheon, is a “kill chain solution” based on “1st look, 1st feed, 1st kill” where each armed unmanned vehicle continuously “seeks out targets on its own” (2003, 16). Tirpak (2001), a US air force specialist, envisages that humans will be required to make the decisions to launch weapons at targets only “until UCAVs establish a track record of reliability in finding the right targets and employing weapons properly”. Then the “machines will be trusted to do even that”.

CONCLUSIONS

“The ultimate expression of sovereignty resides [...] in the power and capacity to dictate who may live and who must die” (Mbembe, 2003, 11)

A large-scale military research and development programme is currently underway in the United States to tailor the ‘Revolution in Military Affairs’ to the specific micro-geographies of the global south cities that many US military theorists envisage to be their main ‘battlespaces’ on the 21st century. Here the

cutting-edge techno-scientific efforts and priorities of the world's dominant military power are being shifted dramatically from an emphasis on globe-spanning control, networking and vertical targeting -- treating planet Earth as some unitary, ageographical 'battlespace' -- to one aimed at bringing maximum control, surveillance and killing power to the detailed micro-geographies of the burgeoning urban environments of the global south.

Such dreams of omnipotence must, of course, be treated with caution. The US military, and its associated complex of R and D outfits, have, after all, long held fantasies of superweapons which would deterministically realise their dreams of mastery and omnipotence (Franklin, 1988). As now, such technophilic dreams of mastery have usually evolved closely with the wider discourses of speculative fiction and popular geopolitical domains and entertainment industries (Gannon, 2003). The 'technological fanaticism' of both has deep roots within US political, popular and military culture (Sherry, 1987). As Jeremy Black (2001, 97) suggests, we therefore need to be careful to interpret the RMA, and its latest 'urban turn', not as some quasi-rational response amongst US military and political elites to changing geopolitical conditions, but, rather, as "symptomatic of a set of cultural and political assumptions that tell us more about modern western society than they do about any objective assessment of military options".

Moreover, we must also remember that the 'U.S. military' is far from being some single, unitary actor. All of the discourses, projects and programmes analysed in

this paper remain extremely contested. Within the vast institutional complex that together constitutes the 'US military', and its associated security and military industries and lobby groups, major political battles are underway – fuelled by the ongoing nightmare in Iraq -- over the degree to which technophilic dreams of omnipotence, through some urbanised 'RMA' or 'network centric warfare,' are realistic, even in military terms. Many in the US Army, in particular, are deeply sceptical that the horrors and 'fog of war' in bloody 'urban operations' like the Iraqi insurgency can ever really be technologised, mediated, and saturated with sentient surveillance and targeting systems, to anything like the degree that is common in the discursive imaginings driving the programmes discussed above.

Whilst what I have called here the urban turn in the RMA is, of course, being driven by often wild and fantastical discourses, its effects are likely to be very material and profound. Massive techno-scientific efforts to equip the US military so that they can saturate global south cities with real-time surveillance, targeting and killing systems are undoubtedly underway. The latest military-industrial-'security' research drive is focusing on using new algorithmic surveillance capabilities to try and overcome the ways in which the micro-geographies of global south cities are portrayed as environments which interrupt wider dreams of US military and technological omnipotence.

Whether such systems will ever function as imagined even in military terms is, then, beside the point. The very existence of an imperial project for launching

the world's dominant military power's high-tech warfare systems into global south cities will – if implemented -- inevitably lead to widespread civilian casualties. This seems especially so as new algorithmic systems seem likely to emerge which are the actual agents of continuous, autonomous killing as 'kill chains' are 'compressed', 'sensors' are linked automatically to 'shooters,' and the dreams of 'persistent area dominance' achieve full expression through the favourable context of the Bush Administration's large post-9-11 defence spending increases. To put it mildly, dreams of clinically identifying and surgically killing only 'fighters' within cities, through the use of 'autonomous' computer algorithms and fantasies of 'brain scanning', are both dangerously deluded and deeply disturbing. It seems very probable that deploying such systems would result in the death and injury of many civilians. Here we confront the added and deeply troubling development whereby software agency emerges as the ultimate 'intelligence' automatically stipulating who should die and who should live whilst at the same time attempts are made to remove US military personnel as far as possible from risk to death and injury. As the 'war on terror' seeks to project notions of war that are unbound in time and space, so the sovereign power to kill is in the process of being delegated to computer code.

REFERENCES

Ackerman , R. (2002), "Persistent surveillance comes into view", *Signal Magazine*, Available at www.afcea.org/signal/, February 2005.

Arquilla, J. and Ronfeldt, D. (Ed.)(2001), *Networks and Netwars*, RAND: Santa Monica.

Barnett, T. (2004), *The Pentagon's New Map: War and Peace in the 21st Century*, Putnam: New York.

Barocas, S. (2002), "9-11: A strategic ontology: Pre-emptive strike and the production of (in)security", *InfoTechWarPeace*, August 6, www.watsoninstitute.org/infopeace/ available March 2005.

Black, J. (2001), *War*, London: Continuum.

Book, E. (2002), "Project metropolis brings urban wars to US Cities", *National Defense*, April, available at http://www.findarticles.com/p/articles/mi_go2148/is_200204/ai_n6918069, February 2005.

Cohen, E. (2004), "Change and transformation in military affairs", *Journal of Strategic Studies*, 27(3), 395-407.

DARPA, (2003), *Combat Zones That See Program*: Proper Information. Available at www.darpa.mil/baa/baa03-15.htm, February 2005.

Darpa, (2004), *HURT- Heterogeneous Urban RSTA Team, Briefing to Industry*, Darpa: Washington D

Davis, M. (2004a), "The urbanization of Empire: Megacities and the laws of chaos", *Social Text*, 22(4), 9-15.

Davis, M. (2004b), "The Pentagon as global slum lord", *TomDispatch*, <http://www.tomdispatch.com/>, April 19th, accessed June 10th.

Defense Watch (2004), "Combat zones that 'see' everything", available at <http://www.argee.net/DefenseWatch/Combat%20Zones%20that%20'See'%20Everything.htm>, March 2005.

Der Derian, J. (2001), *Virtuous War : Mapping the Military-Industrial-Media-Entertainment Complex*, Boulder, Co. : Westview.

Dickson, K. (2002a), "The war on terror: Cities as the strategic high ground". Mimeo.

Dickson, K. (2002b), "Future war as urban war: How asymmetric strategies will affect cities". Mimeo.

Defense Intelligence Reference Document (DIRC), (1997), *The Urban Century: Developing World Urban Trends and Possible Factors Affecting Military Operations*, Marine Corps Intelligence Agency, Quantico: VA.

Duffield, Mark. (2002). "War as a network enterprise: The new security terrain and its implications" *Cultural Values*. 6: 153-165.

Ek, R. (2000), "A revolution in military geopolitics?", *Political Geography*, 19, 841-874.

Erwin, S. (2004), "Urban battles highlight shortfalls in soldier communication", *National Defense*, September, available at

www.nationaldefensemagazine.org/

issues/2004/Sep/Urban_Battles.htm, March 2005.

Franklin, H. B. (1988), *War Stars: The Superweapon and the American Imagination*, Oxford : Oxford University Press.

Gannon, C. (2003), *Rumors of War and Infernal Machines: Technomilitary Agenda-Setting in American and British Speculative Fiction*, Liverpool University Press: Liverpool.

Glenn, R., Steed, R., and Matsumara, J. (eds.) (2001) *Corralling the Trojan Horse: A Proposal for Improving U.S. Urban Operations Preparedness in the Period, 2000-2025*, Santa Monica, CA. RAND

Graham, S. (2003), "Lessons in urbicide", *New Left Review*, 19, Jan/Feb, 63-78.

Graham, S. (2004a), "Vertical geopolitics: Baghdad and after", *Antipode*, 36(1), 12-19.

Graham, S. (2004b), "Cities and the 'war on terror,'" paper submitted *International Journal of Urban and Regional Research*.

Graham, S. (2005), "Switching cities off: Urban infrastructure and US air power", *City*, 9(2) (forthcoming).

Grau, L. and Kipp, J. (1999), "Urban combat: confronting the spectre," *Military Review*,. Vol. LXXXIX No. 4 (July-August 1999), pp. 9-17

Gray, C. (2003), "Posthuman soldiers and postmodern war", *Body and Society*, 9(4), 215-226.

Gregory, D. (2004), *The Colonial Present*, Blackwell : Oxford.

Grubbs, L. (2003), *In Search of a Joint Urban Operational Concept*, School of Advanced Military Studies, Fort Leavenworth, Ka.

Hardt, M. and Negri, A. (2000), *Empire*, Harvard University Press : Cambridge, Ma.

Hardt, M. and Negri, A. (2004), *Multitude*, London: Hamish Hamilton.

Hebert, Adam. 2003. 'Compressing the kill chain.' *Air Force Magazine*, March: 34-42.

Hewish, M. and Pengelley, . (2001), 'Facing urban inevitabilities: Military operations in urban terrain', *Jane's International Defence Review*, August, 13-18.

Hills, A. (2004), *Future Wars in Cities*, London: Frank Cass.

Houlgate K. (2004), "Urban warfare transforms the Corps", *Naval Institute Proceedings*, November, Available at http://www.military.com/NewContent/0,13190,NI_1104_Urban-P1,00.html, February 2005.

Huber, Peter and Mills Mark. 2002. 'How technology will defeat terrorism.' *City Journal*. 12: 24-34.

Kenyon, H. (2004), "Connectivity, persistent surveillance model future combat", *Signal Magazine*, Available at , February 2005.

Kirsch, S. (2003), "Empire and the Bush doctrine", *Environment and Planning D: Society and Space*, 21, 1-6.

Lawlor M. (2004), "Robotic concepts take shape", *Signal Magazine*, Available at www.afcea.org/signal/, February 2005.

Leonhard, R. (2003), "Sun Tzu's bad advice: Urban warfare in the information age", *Army Magazine*, April. Available at <http://www.ausa.org/www/armymag.nsf/0/AA1C74DA9302525585256CEF005EED3D?OpenDocument>, February 2005.

Luft, K. (2005), "Urban terrain zone co-ordination project". US Army Combat Support Team.

Mbembe, A. (2003), "Necropolitics", *Public Culture*, 15(1), 11-40.

Misselwitz, P. and Weizman, E. (2003), "Military operations as urban planning". In Franke, A. (ed.) *Territories*, KW Institute for Contemporary Art : Berlin. 272-275.

O' Mara, R. (2003), "Stealth, precision, and the making of American foreign policy", *Air and Space Power Chronicles*, June, Available at www.airpower.maxwell.af.mil/airchronicles/cc/omara.html. February 2005.

Norton, R. (2003), "Feral cities", *Naval War College Review*, 56(4), 97-106.

Peters, R. (1996), "Our soldiers, their cities", *Parameters*, Spring, 1-7.

Pieterse, J. (2004), "Neoliberal empire", *Theory, Culture and Society*, 21(3), 118-140.

Pinney, C. (2003), *UAV Weaponization*, Washington DC: Raytheon.

Project for the New American Century, (2000), *Rebuilding Americas Defenses*, Washington.

Robert, M., Secor, A., and Sparke, M. (2004), "Neoliberal geopolitics", *Antipode*, 35(5), 886-897.

Sherry, M. (1987), *The Rise of American Air Power : The Creation of Armageddon*, New Haven : Yale University Press.

Sniffen, M. (2003), "Pentagon project could keep a close eye on cities", Philly.Com, available February 2005.

Stone, J. (2004), "Politics, technology and the revolution in military affairs", *Journal of Strategic Studies*, 27(3), 408-427.

Taw, J. and Hoffman, B. (2000), *The Urbanization of Insurgency*, RAND: Santa Monica, Ca.

Tirpak. J. (2001), "Heavyweight contender", *Air Force Magazine*, 85(7), available at <http://www.afa.org/magazine/July2002/> (August 15th 2005).

Tyson, A. (2004), "US tests new tactics in urban warfare", *Christian Science Monitor*, Available at csmonitor.com, February 2005.

Vickers, M. and Armitage, R. (2001), *Future Warfare 20XX Wargame Series: Lessons Learned Report*, US Government Center for Strategic and Budgetary Assessment.