FUTURE SUB-LETHAL, INCAPACITATING & PARALYSING TECHNOLOGIES -

THEIR COMING ROLE IN THE MASS PRODUCTION OF TORTURE, CRUEL, INHUMANE & DEGRADING TREATMENT

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1. INTRODUCTION

This paper covers the emergence of new sub-lethal, incapacitating and paralysing technologies and their coming role in the mass production of torture, cruel, inhumane and degrading treatment. It grew out of the work the Omega Foundation has undertaken for Amnesty International (on electroshock, restraining and torture technologies),[1] the European Commission,[2] the European Parliament[3] and Landmine Action[4]. Throughout its existence, Omega has tracked technologies, particularly less-lethal weapons) deployed by the police, military and security services to create human rights violations, including weapons used in torture.[5] However, such technologies have always been seen by us as multi-functional, weapons of flexible response rather than specifically designed just for a role in torture.[6]

Thus in many senses, to look for specially designed implements of torture is a rabbit hole, since very few manufacturers would deem such a role for their products. There are of course exceptions, for example, the House of Fun electronic torture chamber designed for the Dubai Special Branch by a company here in London.[7] Standard operating procedures become routinely used in torture and should be considered as a form of torture software[8], with the teaching of the torturers as a live-ware capable of being exported and replicated.[9] Some of these devices and techniques are bespoke. For example, the Apollo machine devised by Savak, the Shah s secret police in Iran (it delivered an electric shock to sensitive parts of the body whilst a steel helmet covered prisoners heads to amplify their screams) was also used by the succeeding regimes religious police.[10] Others, such as the sensory deprivation techniques evolved by the British Army in Northern Ireland, now form part of the interrogation procedures by Special forces throughout the world.[11]

The term specially designed implements of torture as an official term originated with the US Export Administration Regulations of June 15, 1984. Regulation 5999B required that a valid licence for such equipment was not required for Australia, Japan, New Zealand and NATO(which of course includes Turkey). Subsequent commerce department descriptions of electroshock shields categorized them as shields used for torture and many of the destinations for export were congruent with Amnesty s map of the torturing states. However these official designations are the exception and if we are looking to control future technologies used to create cruel, inhumane and degrading treatment, we will most likely find that they have other designated roles. These will include prisoner control, peacekeeping, area denial and less-lethal crowd control.

In the sections which follow, the paper looks at some of the most worrying

human control systems emerging on the horizon including alternative landmine and border control systems as well as new chemical, biological and directed energy weapons for controlling and harassing civilians and combatants together.

2. THE EMERGENCE OF A U.S. LESS-LETHAL WEAPONS DOCTRINE

Much of the future incapacitating and paralysing technologies will originate from the embryonic work currently being undertaken in the United States as part of their less-lethal weapons doctrine - a doctrine now adopted by NATO[12]. It began in the early 1990's, when futurologists (Alvin & Heidi Toffler)[13], joined forces with two well meaning but naive American Quakers (Chris and Janet Morris),[14] and a former Green Beret s commander (Lt. Col John Alexander) to advocate that the US military adopt so called non-lethal warfare[15]. In the wake of humiliating US military debacles in Somalia and the disastrous Waco incident, this lobbying for bloodless warfare found a willing ear as a public relations gift.[16] The possibilities were especially welcomed in the US Nuclear Laboratories of Los Alamos, Oak Ridge and Lawrence Livermore who were casting around for new work at the end of the Cold War. The consequences were a series of super secret black box programmes ostensibly aimed at creating weapons capable of subduing, soldiers, rioters and prisoners without killing them.[17] The laudable goal is of course reinforced by America s horrific civilian death toll from firearms and the real needs of the police to be able to deal with armed, drugged and deranged citizens in a less terminal way.[18] Other commentators pointed out that military and police violence is a continuum and it was not either non-lethal, or lethal violence, but both & more. Such CNN-friendly weapons whilst designed to offer a flexible public relations response, will in practice make the battlefield more not less-lethal.[19]

Yet through the Nineties, it became obvious that although the United States would still have to plan for major wars with sovereign states, an increasing role for counter-terror and counter revolutionary operations would require this new kind of weaponry.
Even before September 11th 2001, this doctrine was asserting that it is unrealistic to assume away civilians and non-combatants, taking the view that the US must be able to execute its missions in spite of and/or operating in the midst of civilians.Bitter experiences both in the Horn of Africa and in the former Yugoslavia persuaded military planners that in future, non-lethal weapons should have a *strategic* rather than just a *tactical* role.

Therefore the US Army non-lethal warfare requirement assumes a dirty battlefield meaning civilians and non-combatants will be mixed with combatants and therefore targeted together.US and NATO doctrine were changed accordingly.[20] They are now presented as part of a more effective and humanitarian mission orientation of the US and NATO in the 21st Century, expanding the range of options available to commanders; to discourage, delay or prevent hostile actions; limit escalation; take military action in situations where lethal force is not the preferred option; better protect our forces; temporarily disable equipment, facilities and personnel. [21]

Of course, for many years the US used so called non-lethal weapons in its prisons, for crowd control and often in conjunction with lethal force during war such as the massive use of CS in Vietnam against combatants and non-combatants alike. A key strand of such work involved the creation of non-lethal weapons for interrogation or as Peter Watson has put it, war on the mind. [22] After World War II, many countries examined the use of chemicals for the manipulation of human behaviour and a rich seam of pharmacological work opened up to facilitate these needs and the creation of mechanisms to induce, debilitation, dependence and dread[23]. One of the best documented chronologies on such disabling chemicals was prepared by Julian Perry Robinson for the Pugwash conferences.[24]

Much of the earlier US work on the use of psycho-chemicals such as LSD concerned the holy grail of one to one targeting for both punishment and information extraction. Robinson s work provides some of the best documentation detailing American research into a wide range of agents being to induce incapacitation and its efforts to re-categorise these chemicals within the terms of the Chemical Weapons convention as merely riot control agents. Further empirical evidence on the human testing of psychedelic chemicals in the past at Porton Down was recently reported by Rob Evans[25]

Current US military policy is to think of such allegedly non-lethal weapons as providing a force continuum, a force multiplier and a flexible response. Much of the public relations side of this work is now entering the public domain in the guise of benign warfare.[26] Such weapons are advocated for the task of full spectrum dominance and senior personnel like Major General John Barry identify a range of technologies relevant to that role including obscurants, chemicals, super-caustics, super lubricants; foam, pulsing lights, infra-sound, high power microwave and entanglements.

An early insight into the potential tactics to be used in new wars using these wepons was provided by Russell Glenn of The Rand Corporation in a presentation where he outlined their role in taking out super cities of more than ten million through selective dominance. Non combatant control was envisaged through using non-lethals such as calmatives to remove combatants out of areas where they could be used as human shields and the potential use of robots and foam guns to seal off selected parts of a megapolis.[27]

The proffered solution is to use non-lethal technologies to deny access of enemy troops and noncombatants into proscribed areas using sector and seal capabilities. These hyper-controlled engagements would involve Robotic delivery of foams to seal passageways, use of acoustic or microwave non-lethal systems, and remotely delivered lethal or non-lethal obstacles would act to fix canalize, turn or block forces that could then be targeted via the co-ordinated use of enhanced ISR [Intelligence, Surveillance and Reconnaissance] capabilities and accurate engagement systems.[28]

The risk in these weapons is both political and literal since considerable

persuasive power must be inherent if they are to be effective. According to the doctrine, Non-Lethal Weapons must achieve an appropriate balance between the competing goals of causing death, permanent injury and collateral material damage, and a high probability of having the desired anti-personnel or anti-materiel effects.[29] What follows is a brief evaluation of some of the these and other mass incapacitating & disabling technologies from a human rights rather than a force multiplying PR enhancing perspective[30].

3. FRONT RUNNER INCAPACITATION & DISABLING TECHNOLOGIES

Most commentators on the small arms and light weapons industry have rather neglected the emergence of sub-lethal weapons, regarding them as merely riot control technologies. Indeed many of the kinetic energy weapons, chemical delivery devices, water canon, electrical stun devices, tasers, capture nets and disorientation devices have been around for over 30 years. [31] Many European police forces continue to research variants of these weapons to upgrade their crowd control arsenals. However, it is the second generation technologies we are principally concerned with here.

For example, the US Army has identified a range of technologies used to facilitate such options which include anti-traction devices(eg liquid ball bearings being researched by SouthWest Research Institute in Texas), acoustic weapons (including Vortex ring Guns being researched by ICT in Germany[32]), entanglements and nets(produced by Foster-Miller in Mass), malodourous munitions (produced the Monell Chemical Senses Center in Philadelphia), obscurant and sticky foams, directed energy systems ,isotropic radiators and radio frequency weapons(such as the vehicle mounted $40 million VMAD system which uses high power microwaves to heat up a human target to induce an artificial fever), expected to be in the field by 2009.[33].

The presentation to the seminar will cover some of these new paralysing technologies in greater depth. Here it is sufficient on the basis of Omega s previous work for Landmine Action and for the Swiss Small Arms Survey to briefly outline notes on some of the key technologies being pursued, together with an indication of the estimated timescale before prototype or deployment stages. Many of these technologies have the capacity to be automatically triggered by victims as booby traps or victim activated area denial and border alert systems which can inflict either wounds or other forms of punishment which require medical treatment. Several other technologies earmarked for further research are capable of creating mass or multiple paralysis effects. Instead of benign intervention existing less-lethal weapons such as chemical riot control agents and plastic bullets have already been reported to be facilitating gross human rights violations including torture[34] It has been suggested that

emergent less-lethal weapons by acting as force multipliers, will used to enact mass punishment. After all, immobilisation increases targetability and what the US are now calling neutralisation.[35]

By 2001, the search for second generation less-lethal weapons was moving into a new phase. The JNLWD was examining three technology investment programmes including thermobaric technology for non-lethal incapacitation; front end analysis of potential non-lethal chemical materiels for further testing that have minimal side effects for immobilising adversaries in military and law enforcement scenarios; and veiling glare effects of violet laser exposure to humans (see below).(A summary of technology types, mechanisms, negative health impacts, and legal and human rights hazards is provided as Table 1)

3.1 Less-Lethal Anti-Personnel Landmines

One of the key technologies being considered for border exclusion is the Taser Anti-personnel Munition(TAPM). This device shoots multiple darts carrying 50,000 volts into a person to interrupt their brain s control of the part of the nervous system and paralysing the muscle-skeletal system. The target collapses whilst remaining fully conscious for as long as the batteries keep working. Little research is available on how this might effect someone in the long term from post traumatic stress syndrome. There is a further hazard in a mixed combatant/ non-combatant or dirty battlefield of such devices being used to facilitate rape or selective culling.[36] Progress on this technology has been prioritised since Omega came across the first prototype at the Force Protection Equipment Demonstrtion in 2001, at the Marine HQ in Quantico.[37]

The Pentagon is know to be searching for a wireless version of such devices. One option being researched by HSV Technologies uses an tentanizing ultraviolet laser which ionizes the air and can then conduct more than 100,000 volts to a human target. Operational prototypes are being tested but smaller hand held versions of this wireless taser are being sought and may have some relevance to the JNLWP priorities in 2001 mentioned above.

3.2 Malodourous & Calmative Munitions

Professor Malcolm Dando at Bradford University s Peace Studies department was one of the first academics to warn of the risks associated with new chemical and biological incapacitating weapons in as series of well argued technical articles about the possible malign use of knowledge being gained because of the ongoing revolution in genomics.[38] Work on the cloning of endiothelin and the bio-regulatory peptides such as substance P are already being examined as warfare agents.[39]

By 1999, the JNLWD was looking at dispersal mechanisms for malodourous substances based on mebraneous balls which break when trodden on. Scientific

Applications and Research Associates of Huntington Beach California are already weaponizing prototype malodourants which are intended to warn, annoy, disgust or nauseate. Some smells are more disgusting to particular cultures. A number of synthetic malodourants exist. For example DeNovo makes Dragonbreath and others are in development including concentrates of natural odours such as rotting meat, faeces, skunk and BO.[40]

The micro-enscapsulation programme will work for other incapacitating materiels as well. In the last few years, small arms have appeared which use this technology such as the pepper ball gun. The Belgian small arms company FN Herstal for example, were one of the first European small arms companies to market a gun with malodourous munition options based on cadaver scent.[41]

Further evidence of ongoing US work on chemical incapacitating weapons for the US non-lethal programme has been diligently collated by the Texas based Sunshine Project.[42] One such area is the US military search for calmatives for mass tranquillization and work identifying potential agents has been increasing at a pace. These include the benzodiazepines, alpha2 adrenoreceptor antagonists, dopamine D3 receptor agonists, serotonin selective reuptake inhibitors, serotonin 5-Ht receptor agonists, opioid receptors and mu agonists, neurolept anaesthetics, corticotrophin-releasing factor receptor antagonists and cholecystokinin B receptor antagonists as well as a range of convulsants, illegal club drugs and what are charmingly called orphan phamaceuticals[43] - essentially drugs too dangerous to get past Medical Councils but with a potential weapons role if civilians can be regarded as expendable.

A report to the EU Parliament in 2000 warned of such developments and recommended that all EU countries adopt the UK standard known as the Himmsworth Committee recommendations, namely that all chemicals being considered for riot control and law enforcement should be considered as drugs and subject to the same safety checks and that this research should be openly published in scientific journals in advance of any authorisation of usage.[44] In the case of calmatives, such caveats are vital since one persons tranquillization is another person s lethal dose.

3.3 Bio-weapons For Racially Selective Mass Control

As a result of breakthroughs in the Human Genome and the Human Diversity Projects and the revolution in neuroscience, the way has opened up using blood proteins to attack a particular racial group using selected engineered viruses or toxins. A recent report to the Scientific and Technological Options Assessment (STOA) Committee of the European Parliament has suggested that whilst such a possibility of genetic weapons was dismissed in the past because human beings are so genetically similar, recent scientific breakthroughs biotechnology including gene therapy now make them feasible. The differences in blood group proteins are now thought to be sufficiently stable and large for them to be targeted by using genetically modified organisms or toxins which select for a particular genetic marker.[45] The report warns that as the data on human receptor sites accumulates, the risk of breakthroughs in malign targeting of

suitable micro organisms at either cell membrane level or via viral vector, grows accordingly.[46]

Given the heterogeneous nature of many populations including those in Europe and the US, only certain areas and borders could be targeted without the risk of so called friendly fire. Unfortunately, this has not deterred certain governments from undertaking preliminary research to potentially target specific ethnic groups either within their own state or on their borders. In 1997, in a confidential Pentagon Report, US Defence Secretary William Cohen, warned that he had received reports of countries working to create types of pathogens that would be ethnic specific. This warning was given credence a year later when the Sunday Times reported that Israeli scientists working at the biological institute in Nes Tziyona[47] were exploiting medical advances to identify genes carried by some arabs and to engineer organisms which would attack only those bearing these distinctive genes.

The work mirrored that of Daan Goosen, the Head of a South African biological warfare plant who has alleged in hearings to the Truth Commission that his team was ordered to create a pigmentation weapon which targeted only black people. That work failed but the Israeli team according to the Sunday Times have succeeded in pinpointing a particular characteristic in the generic profile of certain Arab communities, particularly the Iraqi people[48]. The disease could be spread either by air spraying the organisms of inserting them into the water supply. However the newest dispersion mechanisms for CBW agents is micro-encapsulation which is being advanced in the US for anti-materiel and anti-personnel Non-lethal weapons related to area denial and vessel stopping. The technology consists of micro balls of the active agent surrounded by a thin shell wall whose properties are specific to the application and are designed to release the agent upon pressure, contact with water, or at a specific temperature. [49]

All such products would be illegal under the 1972 Biological Weapons Convention. However, unlike the CWC, there are no agreed verification procedures. The BTWC has the status of a gentleman s agreement - the review conference in 2001 was effectively sabotaged by the US. Consequently, research on this area is accelerating as drug companies race towards mapping out human receptor sites in the brain to bio-engineer specific drug effects. This work will be examined most meticulously by the worlds CBW laboratories and unless very effective measures are put in place it is likely that malign applications will emerge. [50]

3.4 Entanglements

Otherwise know as stickum and slickem . They are now available commercially. We are collating data on three varieties, namely slippery substances known as instant banana peel[51], expanding sticky foam guns and barrier devices and nets which come with options for including sticky adhesive, chemical irritant, electroshock and razor blades.

3.5 Directed Energy Weapons

Directed weapons offer what is known as a tuneable munition and such a capability now goes hand in hand with the Pentagon s notions of layered defence. [52] Essentially this means attacking civilians and combatants together assuming an onion approach where each progressive layer becomes more lethal with combatants at the centre of the onion being targeted with old fashioned lethal force.

These are perhaps the most controversial and potentially illegal (viz EU directive, SiRUS laser ban etc) variants of alternative APM s. Directed Energy or Radio frequency Weapons using the microwave part of the electromagnetic spectrum are probably the most controversial area of development. They are discussed in Non-Lethal Weapon circles but little in the way of hard data is provided given their sensitivity. They are seen as offering a potential rheostatic or tunable response from less-lethal; to lethal. Already demonstrated is the ability to induce a heating effect up to 107 degrees F to induce an artificial fever. There has been much speculation but a dearth of hard data about such psychotronic weapons which are already worrying those concerned about bioethics. Such electronic neuro-influence weapons would be in breach of the recent EU resolution regarding technologies which interact directly with the human nervous system. Voice to skull technology has already been discussed in the literature.

3.6 Acoustic Weapons Acoustic weapons again might be accurately thought of in terms of a directed energy weapon and again surrounded in controversy. They are allegedly able to vibrate the inside of humans to stun, nauseate or according to one Pentagon official to liquify their bowels and reduce them to quivering diarrhoreic messes. [53] Other writers argue that this is nonsense because the physics doesn t add up.[54] We know that explosive devices deployed in Russia created damage to hearing and it is likely that any workable device would be based on controlled explosions.

One US based corporate research group. Scientific Applications and Research Associates (Sara) reported to be building an acoustic device to make internal organs resonate. Reported to be undergoing trials in 1998 by US Marines, supposedly protects buildings by inducing sea sickness in would be intruders.[55] SARA s acoustic devices have reportedly been tested at the Camp Pendeleton Marine Corps Base, near the company s Huntington Beach office. This system allegedly works on the Vortex ring concept and the final report will discuss in much greater detail the physics behind this development and its associated health consequences. Altman believes such devices breech the SirUS criteria by attacking one specific part of human anatomy and making requisite treatment difficult if not impossible in field conditions.[56]

3.7 Laser Systems

Some Laser dazzler systems are already commercially available and sold as an optical shield, for example those made by LE Systems[57] and others are currently under investigation by the United States Air Force Research Laboratory at the

Phillips Research site for so called non-lethal point defence.[58] A recent development has been to use a Ultra-Violet laser which can ionise the air sufficiently for it to conduct an electric charge. This enables an electric shock to be delivered over some distance to create muscle paralysis or tentanization.[59] A fully working prototype is still some way off but the principle has been successfully tested using a Lumonics Hyper X-400 excimer laser at the University of California at San Diego.[60]

3.8 Robotic Area Denial Systems

The use of robots in bomb disposal or explosive ordnance operations has become routine over the past 20 years. Their use in clearing landmines is now receiving much attention and research activity. A number of companies offer such systems for example OAO Robotics of Ijamsville, USA and Engineering Services Inc, Toronto, Canada[61] although their efficacy is strongly disputed by some researchers.[62]

Conversely, however, there are a number of companies and organisations that are researching the possibilities of autonomous security robots or robots as weapons platforms, which opens the possibility of them acting in an area denial function. Robots activated by surveillance and used to undertake selective attacks with less-lethal devices are now being actively pursued. Already, Robot Defense Systems of Colorado have created the Prowler - an armed 2 ton wheeled vehicle designed for sentry duties. Non-lethal weapon advocates Alvin and Heidi Toffler inform us that the US firm Bechtel International has proposed its use for security installations in the Middle East.[63]

The origins of many of these developments can be traced back to the US s aversion to casualties and a recognition that autonomous robotic ground vehicles might reduce such risks.[64] Thus, although most robots, and unmanned vehicles in general, have been designed for surveillance functions, increasingly military doctrine is looking to this technology to remove the soldier from hazardous situations. Advances in augmented reality (which has replaced failed attempts to give robots artificial intelligence) will in future enable computer and operator to co-operate to achieve what neither could alone .[65]

In the late 1990's the US Marines became even more interested in the potential of robotic vehicles for military operations in urban terrain (MOUT) and identified future requirements for 2000 onwards that include advanced delivery robots and unmanned vehicles carrying less-lethal weapons.[66] In 1998, US Defense Advanced Research Projects Agency (DARPA) planned to spend $40 million over a four year period on a Tactical Mobile Robotics Programme. DARPA s third phase of its Robotics for Urban Terrain initiative began in 1999 (at a cost of some $15 million) designed to produce a robot pointman .[67] Recently, DARPA selected NASA s Jet Propulsion Laboratory to lead a consortium to create a miniature tactical mobile robot for urban operations. [68]

Already a wide variety of mobile security robots including MDARS - interior; CYBERGUARD; ROBART III and MDARS - exterior have emerged on the market.[69]

Some of these robots are armed, e.g. the weaponized Andros robot produced by EMOTEC, a subsidiary of Northrop Grumen.[70] The Tucson Police Department are already using a Remotec Andros 6A robot, which has been in service since 1997. They have developed a range of non lethal weapons for Special Weapons and Tactics (SWAT) operations including robot deployment of a12 gauge bean bag, Sage riot gun, a grab net, chemical munition deployment - plus a door and window breaching capability.[71]

A number of concept demonstration robots exist which envisage armed autonomous robots independently identifying and engaging targets, the most advanced example is the Robart 3, developed by the Space and Naval Warfare Systems Centre (Spawar) in San Diego. It includes a Gatling gun-type weapon that fires darts or rubber bullets. Sandia and ARL are also reported to be involved in the create a lethal robotic pointman.[72]

We are now at the cusp of seeing patrolling autonomous robots. DARPA have a programme on self deciding vehicles (SHARC program).[73] Toffler was exploring the idea of inter communicating robot gangs which begs the question can robots accept a surrender or are Punishment Park scenarios inevitable?. These robot gangs are now a reality. Sandia National Laboratories in the US has developed and fielded a robotic perimeter detection system that relies on gangs of small RATLER, robotic, all terrain vehicles, to protect the perimeters of large bases or installations.[74] The Mobile Detection Assessment and Response System Exterior (MDARS-E) is a similar system for warehouses and other flat areas.[75]

4. NEW INCAPACITATION TECHNOLOGIES & HUMAN RIGHTS ABUSE

The US military is far from naive in terms of the advantages and disadvantages of Non-lethal Weapons. It is the first to admit that the role of these technologies is that of force supplementation rather than replacement and that their remain and outstanding set of problems in regard to existing international conventions and treaties. Whilst the public relations presentation of this policy is benign intervention, the Omega Foundation sees the ever present risk of creating a wide range of unanticipated consequences, particularly given that even one of the original proponents of the doctrine see attacks on refugees as a legitimate role.[76]

The difficulty for those attempting to control these weapons is likely to be that the first purpose and presentation of these technologies will be as alternatives to lethal firepower. Many of the weapons discussed below offer what is known as a tuneable munition and such a capability now goes hand in hand with the Pentagon s notions of layered defence. [77] Essentially this means attacking civilians and

combatants together assuming an onion approach where each progressive layer becomes more lethal with combatants at the centre of the onion being targeted with old fashioned lethal force.

NATO policy is quite explicit on this:

" The availability of Non-Lethal Weapons shall in no way limit a commander s or individual s inherent right and obligation to use all necessary means and to take all appropriate action in self defence.

" Neither the existence, the presence nor the potential effect of Non-lethal Weapons shall constitute an obligation to use non-lethal weapons or impose a higher standard for, or additional restriction on, the use of force. In all cases NATO forces shall retain the option of immediate use of lethal weapons consistent with applicable national and international law and approved Rules of Engagement

" Non-lethal weapons should not be required to have zero probability of causing fatalities or permanent injuries. However, while complete avoidance of these effects is not guaranteed or expected, Non-Lethal Weapons should significantly reduce such effects when compared to the employment of conventional lethal weapons under the same circumstances.

" Non-Lethal Weapons may be used in conjunction with lethal weapons to enhance the latter s effectiveness and efficiency across the full spectrum of military operations. [78]

We are supposed to believe that the major role of these disabling and incapacitating technologies is in creating harmless warfare. Work by the Omega Foundation in the past for the European Parliament reveals a pattern of such less-lethal weapons being used both for punishment and for softening up dissenters before deploying lethal force[79]. There is every expectation that the second generation of these technologies will find similar roles, especially if the companies making such weapons seek wider markets.

Without adequate international controls, we may end up with weapons of mass punishment, and gross human rights violation - taking torture out of the present tradition of 1 (or more) to 1; to a capacity where one person or group can torture or deliberately debilitate and punish 1-to many.

Amnesty for example found pepper-gas being against peaceful protestors in the US in a manner they deemed tantamount to torture. It is not difficult to imagine future chemicals with pain, vomit or hallucination inducing qualities to be used in ways which are similarly abusive. Similarly with microwave weapons alleged to create an artificial fever by raising body temperature which is said to be self-limiting because people will
move out of range because of the pain. But what if the option of going backwards is to

fall into the hands of a state security service offering a more lethal fate or worse. The danger then is that people will be forced to endure a much higher doseage.

The position with chemical calmatives is worse, since there is no way of ensuring a uniform dose and any drug capable of having a measurable impact is likley to have associated toxicity not to mention longer term hazards of mutagenicity, carcinogenicity and tertragenicity. These may take many yeasr to emerge. For example in Northern Ireland, people allegedly gassed with the riot incapacitant CR in the Maze prison are now coming forward to say they have a rare form of cancer[80].

Similarly with Taser munitions. Anyone targeted is expected to endure excruciating levels of pulsed electroshock which even in the best of outcomes is likely to leave sever psychological scars through induced post traumatic stress syndrome.

5. LEGAL ISSUES & INTERNATIONAL LAW

Some of the earliest assessments of the emergent non-lethal arsenals recognised that many of these weapons could violate international conventions and humanitarian law - especially the biological and chemical paralysis systems[81].

The International Committee of the International Red Cross (ICRC) has undertaken some of the first critical assessments of these weapons and concluded that they are not outside the fundamental humanitarian principles of the existing laws of war. Eg the Hague conventions of 1899 and the additional protocols which outline:

" ***the principle of unnecessary suffering***

It is prohibited to employ weapons, projectiles and materiel and methods of warfare of a nature to cause superfluous injury and unnecessary suffering

" ***The principle of distinction***

The Parties to a conflict shall at all time distinguish between the civilian population and combatants and between civilian objectives and military objectives and accordingly shall direct their operations only against military objectives

" ***The Martens Clause***

This clause states that even when neither treaty nor customary law clearly applies, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience. [82]

The debate on International Law and Non-Lethal Weapons is vitally important, if we are to establish the continuance of basic principles of what is and what is not beyond the limits of permissibility in the face of US attempts to define these weapons as lying outside such restrictions. They are not.[83] What we have got is necessary but not sufficient and a more detailed examination of these issues is required if existing international humanitarian law is not to be eroded for the sake of an emergent military doctrine, largely in the possession of a tiny minority of states.

6. CONCLUSIONS

Some of the devices discussed above will find a future role in mass producing torture, cruel, inhumane and degrading treatment. Other technologies will follow as governments find ever new mechanisms to quell dissenters, punish civilians who would migrate into their territory, as well force multiplying tools or as surprise devices to immobilise combatants. At both the UN and the EU levels, we should attempt to

enhance controls on such technologies which are anticipatory in that they can be applied to new devices and inventions on the horizon rather than just the single function torture weapons of old.

This expert seminar will have served its purpose if it begins critical thinking on that process. Not many researchers are actively working in this area and those that are, are often severely pushed because of conflicting demands. If political agreement is reached on what should be further controlled in the future, a greater sharing of expertise must be sought since like all technologies, these systems will continuously change and proliferate.

Alas, good laws, export controls and regulations do not guarantee good practice. Whatever controls are eventually agreed, it is sensible to assume that loopholes will be found accompanied by traditional denials of government and corporate collusion. Taking this as a starting point, it would be prudent for the responsible authorities to re-examine the resources needed both by customs and intelligence agencies to adequately prioritize tracking of malfactors in the future. It would also seem prudent to put in place further field research and audit procedures to ensure that the information required to monitor the torture trail enables a more prophylactic approach.

TABLE 1

POTENTIAL HEALTH & HUMAN RIGHTS IMPACTS OF NEW WEAPONS OF MASS INCAPACITATION

WEAPON TECHNOLOGY	MECHANISM	NEGATIVE HEALTH IMPACTS	LEGAL & HUMAN RIGHTS HAZARDS
High Powered Microwave	Vehicle Mounted Area denial Device using adapted microwave oven technology to target individuals with a beam of non-ionizing radiation to raise the body temperature.	All the hazards associated with microwave radiation. Eyes are particularly vulnerable. Pain induced is meant to make dose self-limiting. Much higher exposure likely if lethal force or worse lies in escape routes.	Targeting of civilians falls foul of Geneva Conventions. Nothing to stop weapon being used for mass punishment. Superfluous injury likely if misused and longer term damage may not show up immediately
Acoustic Devices/Vortex Ring	Very Loud noises to cause disorientation; two ultrasound beams to create infra-sound; pyrotechnically generated sound rings which can either create knock down at a distance or carry other incapacitating agents	Doubts exist about the viability of some acoustic weapons. Permanent damage to the ear possible. Vortex ring technology still at prototype stage but blunt trauma injuries from impact are likely to be similar to those associated with water cannon.	See ICRC

UV Ionising Laser	Laser light in the UV spectrum ionises the air sufficiently for it to conduct high voltage electricity	All those associated with electro-shocking a population diverse in regard to age, sex and medical histories including susceptibility to heart attack etc. Likelyhood of post traumatic stress syndrome.	Geneva conventions relating to attacks on civilians. Potential use for mas torture and cruel inhumane and degrading treatment
Laser Dazzlers	Green or red laser light directed at eyes to temporarily wipe out vision	Effects alleged to be temporary at the strengths used but longer term impact on the eye remains unknown.	All blind humans are at risk from sustaining additional injury, abuse or additional targeting by more lethal weapons
Malodourants	Chemicals recreating foul smells such as corpses, are encapsulated into a medium of micro-balls which can be fired at selected targets or sprayed where anyone attempting to cross the exclusion zone will release the nauseating stench	Suitable chemicals still being researched but some prototype weapons and delivery systems are already on the market.	Potential environmental contamination which could prove damaging especially if the stenches were culturally attuned to offend particular ethnic groups as planned. CWC issues raised

Chemical Calmatives, Convulsants & Bio-regulators	Wide range of chemicals which create a paralysing or incapacitating effect such as tranquillizing or club drugs delivered to target by existing mechanisms for delivering chemical or malodourous agents. Bio-regulators would be targeted at interfering with body functions which maintain steady body temperature, breathing and heart rates etc.	One person s tranquillization is another s lethal dose. Impossible in field circumstances to ensure a unified effect without overdosing certain more vulnerable segments such as elderly people or the very young. Many of the proposed drugs are banned or strictly controlled because of their potential health hazards or because they would never get through any medical or legal committee for the uses envisaged. Long term effects of mass dosage unknown.	Breach of Geneva conventions CWC & BWTC Treaties.Geneva conventions relating to attacks on civilians. All paralysed humans are at risk from sustaining additional injury, abuse, rape or additional targeting by more lethal weaponry.
TASER Mines	A victim activated landmine which shoots out a number of darts carrying 50,000 volts of electricity to immobilize for up to one hour	Hazards associated with using electroshock weapons against a diverse population. Likelyhood of post traumatic stress syndrome	Ottawa Treaty issues if mines are put on totally automatic victim activated mode. But current prototypes have been designed to be Ottawa proof All prone humans are at risk from sustaining additional injury, abuse or additional targeting by more lethal weaponry

Modular Land Mine	Effectively a claymore mine using rubber rather than metal projectiles	To be effective, kinetic energy of the munition is in the potentially sever damage region. All the hazards associated with kinetic energy weapons fired at short range.	Victim activated area denial technology causing sub-lethal and superfluous injury. Potential additional hazards to children. Breach of Ottawa landmine convention if device is on automatic rather than in man in the loop mode...
Armed Robots	Algorithmic self organising intelligent mobile devices armed with either lethal or sub-lethal weapons and capable of operating as a patrolling gang	What was once science fiction is now science fact. Robots bearing incapacitating technologies are potentially programmable deployers of organised violence. The health hazards are those associated with the weapons the devices carry when operated outside of guidelines or in an abusive context	Little exists in current international humanitarian law, to govern the behaviour of autonomous non-human devices. Given the current rate of development in such systems, we can anticipate having to deal with the ethics of machines controlling humans with coercion sooner or later. Particularly worth watching are algorithmic systems

Other Human Immobilizing & Capture Systems	A wide range of other immobilising devices using either capture nets, sticky foam, or suiper slippery lubricants - so called liquid ball bearings are appearing on the market	Some of these devices such as fish-hook nets have paralysing additions such as chemicals, electroshock etc which create their own hazrds. Other systems such as sticky foam when used as a weapon have had problems both with avoiding the risk of asphixiation.	Some of these devices have been packaged as victim activated and are therefor covered by the Ottawa Treaty. Any capture system with additional immobilizing systems can be used for punishment. Any prolonged usage would be associated with Post Traumatic Stress Syndrome. Other area denial systems using super-lubricants come within the scope of the CWC

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2. Omega is involved in direct field research Tracking the Armourers of the Torturers on behalf of the EC.

3.In the form of two contracted reports for the European Parliament s Scientific and Technological Options Assessment panel, (STOA), namely: An Appraisal of the Technologies of Political Control (PE 166.49) December 1997: http://jya.com/stoa-atpc.com and Crowd Control technologies: An Assessment of Crowd Control Technology Options For the European Union (EP/1/1V/B/STOA/99/14/01): http://www.europarl.eu.int.dg4/stoa/en/publi/default.htm)

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6.See discussion in Rappert, B. and Wright S., A flexible Response? Assessing Non-lethal Weapons, Technology Analysis & Strategic Management, Vol 12, No.4, 2000, pp.477-492

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