GROUP OF GOVERNMENTAL EXPERTS OF THE STATES PARTIES TO THE CONVENTION ON PROHIBITIONS OR RESTRICTIONS ON THE USE OF CERTAIN CONVENTIONAL WEAPONS WHICH MAY BE DEEMED TO BE EXCESSIVELY INJURIOUS OR TO HAVE INDISCRIMINATE EFFECTS

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REPORT OF THE EXPERT MEETING ON THE HUMANITARIAN, MILITARY, TECHNICAL AND LEGAL CHALLENGES OF CLUSTER MUNITIONS HELD IN MONTREUX, SWITZERLAND, 18 TO 20 APRIL 2007

Submitted by the International Committee of the Red Cross at the request of the Chairperson of the Group of Governmental Experts

INTRODUCTION

The effects of cluster munition use have been a persistent humanitarian problem for decades. History has shown that many models have problems of accuracy and reliability. In nearly every conflict in which they have been used on a large scale, there have been serious humanitarian consequences. Large numbers of cluster submunitions have failed to detonate as intended and instead left a long-term and deadly legacy of contamination. Their use in populated areas has also had direct and indirect impacts. All too often it is civilians who are killed and injured, and it is fragile post-conflict societies which must deal with the social and economic costs of these weapons.

Although the international community has begun to address the problems of explosive remnants of war generically through the adoption of Protocol V to the Convention on Certain Conventional Weapons, it is widely acknowledged that the specific problems caused by cluster munitions need to be urgently addressed. Discussions in recent years in the Group of Governmental Experts of the Convention on Certain Conventional Weapons and among the 47 States associated with the Oslo Declaration on Cluster Munitions as well as reports by a variety of organisations have identified important issues that require frank and in-depth dialogue at the expert level, as well as political decisions, if progress is to be made.

The intention of the International Committee of the Red Cross (ICRC) in hosting the Montreux Expert Meeting was to bring together a limited but balanced group of governmental and independent experts to examine a range of humanitarian, military, technical and legal issues related to cluster munitions and to consider all possible means of reducing their negative impact on civilian populations.

Issues addressed in the meeting included:

- An historical overview of the use and humanitarian impact of cluster munitions;
- The military role of cluster munitions and their technical evolution;
- Possible future alternatives to cluster munitions;
- Potential technical developments to improve reliability and accuracy;
- The adequacy or inadequacy of existing international humanitarian law;
- Potential restrictions on the use of cluster munitions; and
- Next steps foreseen at the national and international levels.

This report contains a short summary by each speaker of his or her presentation, a summary by the ICRC of key issues raised in the discussions and a synthesis by *rapporteurs* of the state of the debate on three key themes: military aspects, technical issues and international humanitarian law. The CD-ROM annexed to this report contains the actual presentations made as well as working documents presented to the meeting by two States in Session VI.

Although the identity and affiliation of speakers is recorded, views presented in the discussions are not attributed to individuals or countries. The ICRC hopes that the meeting itself and the distribution of this report to the many States and organizations which could not be accommodated in Montreux will promote the development of national policy on cluster munitions and contribute to international efforts to address this humanitarian problem in multilateral fora.

Note

An internationally accepted definition of "cluster munitions" does not yet exist. Because most proposed definitions entail assumptions about specific technologies, the matter of definitions was addressed only on the third day of the Montreux Expert Meeting. For working purposes in the meeting, the meaning of cluster munitions was taken to be the same as, and was used interchangeably with, "submunitions", which is defined in the International Mine Action Standards (IMAS 04.10, First Edition, 1 October 2001).

The IMAS definition of a submunition is *any munition that, to perform its task, separates from a parent munition*.

Frequently used abbreviations
CCW: Convention on Certain Conventional Weapons
EOD: explosive ordnance disposal
ERW: explosive remnants of war
IHL: international humanitarian law
UXO: unexploded ordnance

STATEMENT OF DR PHILIP SPOERRI
Director for International Law and Cooperation with the Movement
International Committee of the Red Cross
Expert Meeting on Cluster Munitions
Montreux, 18 April 2007

It is a pleasure to welcome you, on behalf of the International Committee of the Red Cross (ICRC), to Montreux and to this Expert Meeting on the Humanitarian, Military, Technical and Legal Challenges of Cluster Munitions. Much has happened since the ICRC announced its intention to host this event just five months ago. Forty-seven States have committed themselves to conclude an agreement in 2008 which will eliminate those cluster munitions which, when used, can cause unacceptable harm to civilians. Several States have announced moratoria on the use of some or all cluster munitions. Reviews of policy options regarding cluster munitions are occurring in a large number of States. And there is a growing recognition among virtually all States that the human costs of these weapons must be addressed urgently.

We are heartened by such developments. We hope that this expert meeting will deepen insights, identify options and speed up such efforts, thus bringing closer the day when the tragic impact of cluster munitions is a thing of the past.

As government and independent experts, you are already well aware of the impacts which cluster munitions can have on people's lives, their livelihoods and their communities. These impacts have been well documented in the media and by international and non-governmental organizations. Civilians in the countries affected by these weapons, however, are often unaware of the dangers they face until it is too late.

They are often not aware that the hundreds of cluster submunitions falling silently from the sky - probably intended for a military objective several streets away but which are about to explode around their home - will change their lives forever. Nor do they realize that the small object they are about to remove from their land can shatter their life in a second.

Scenarios such as these have occurred far too often during and after conflicts in which cluster munitions have been used. Time and again over the last 40 years, these weapons have shown a disturbing pattern of inaccuracy and unreliability. As a result, in nearly every conflict in which they have been used on a large scale, cluster munitions have caused civilian deaths and injuries and have posed a massive clearance burden. In some parts of the world millions of cluster submunitions still lie buried decades after the conflicts in which they were used have ended.

These facts speak clearly enough about the need for strong national and international action to stop the human suffering caused by cluster munitions. But the prospect of continued proliferation of the massive stockpiles of these weapons is even more sobering. Recent reports of the use of cluster munitions by armed non-State actors leave no doubt as to where things are headed if the problem of these weapons is not addressed by all States or is addressed inadequately through partial measures.

It was these concerns which led the ICRC to repeat, last November, its previous calls for urgent action against cluster munitions. In our statement to the Third CCW Review Conference we called upon all States to take the following steps at the national level:

- to immediately end the use of inaccurate and unreliable cluster munitions;
- to prohibit the targeting of cluster munitions against any military objective located in a populated area;
- to eliminate stocks of inaccurate and unreliable cluster munitions; and
- pending their destruction, not to transfer such weapons to other countries.

We also called for the negotiation of a new instrument of international humanitarian law which would incorporate these measures at the international level.

Despite having some clear views on the types of measures which are needed, the ICRC recognizes that a wide range of actors and expertise is needed to forge an effective international response. None of us has at hand all the humanitarian, military, technical and legal perspectives that need to be considered. But the ICRC believes that within this diverse gathering, a large part of the needed expertise is available.

In organizing this expert meeting, the ICRC hopes to provide a forum for open and in-depth discussion. The meeting is meant to engage with the unique variety of expertise available. We should all be ready to ask new questions, to listen, and to leave with deeper insights, more informed views, and better solutions than we came here with. The objective is not to defend set positions but to illuminate the problems and advance the thinking of governments and organisations alike.

For its part, the ICRC is committed to facilitating dialogue, to recording the expert presentations made and to providing a fair summary of the discussions. We will make available by early June an extensive summary report of the meeting which will indicate areas where a convergence of views is apparent, identify divergences and highlight the challenges ahead. We hope that these discussions and the report itself will provide useful insights to the many States and individuals whom we were unable to accommodate in Montreux and to the upcoming formal State discussions on the way forward.

In addition to the humanitarian impacts I mentioned above, some of the key issues which, in our view, deserve consideration here include:

- What has been the military role of cluster munitions in modern warfare and how has this evolved over time?
- To what extent are the types of cluster munitions currently in stockpiles appropriate for the situations in which they are likely to be used?
- Should solutions entail technical adjustments, the prohibition or elimination of certain types, use restrictions, or a combination of measures?
- What level of confidence can be placed in technical measures as part of a global approach?
- How faithfully and consistently are the existing rules of international humanitarian law likely to be applied and respected in light of the specific characteristics of cluster munitions?

- Can a definition of cluster munitions be developed to cover those types which have caused the humanitarian problem and exclude those which cause a problem only through misuse?
- What is the most effective balance between normative measures at the international level and national actions?

ICRC expert meetings such as this have been an important part of the development and implementation of international humanitarian law. Experts gathered in Lucerne and Lugano in 1974 and 1976 to consider limitations on a range of weapons which may cause unnecessary suffering or have indiscriminate effects. Those meetings were a basis for the development of the Convention on Certain Conventional Weapons. Between 1989 and 1991 ICRC meetings which examined the potential of blinding laser weapons provided a common knowledge base for Protocol IV of the CCW. An ICRC symposium held here in Montreux in 1993 helped develop the thinking of the ICRC, NGOs and many States on the prohibition of anti-personnel mines. As recently as September 2000, experts who gathered in Nyon to understand the problems of unexploded and abandoned ordnance laid the groundwork for the negotiation of the CCW's Protocol on Explosive Remnants of War (Protocol V). It is our hope that your work here in Montreux will also bear fruit by providing the basis for urgent and determined efforts to address the humanitarian challenges posed by cluster munitions.

In closing, it is important to keep in mind the people who are not at this meeting. These are the civilians at risk daily from the presence of cluster munitions and who have been killed or injured by these weapons. These are the families who will provide care and support to the disabled survivors for the rest of their lives. And these are the communities that try to resume a normal life in the presence of unexploded submunitions while waiting to learn which of their sons or daughters will be the next victim. For these, our discussions of the finer points of military utility, international humanitarian law, fuze technology and definitions are “too little and too late”. But if we listen well, combine our sense of humanity with our expertise and leave Montreux committed to working urgently for real solutions, it will not be too late for many, many others.

SESSION I – THE MILITARY ROLE AND HUMAN COSTS OF CLUSTER MUNITIONS

Speaker's Summary:
THE EVOLUTION OF CLUSTER MUNITIONS
Colin King

Origins

The first significant use of cluster weapons was during the Second World War, when German planes dropped SD-2 "Butterfly Bombs" on the English port of Grimsby. Although only 1,000 or so bomblets were dropped, there was chaos in the town for weeks and the clearance task took around 10,000 man-hours. Almost as many people were killed *after* the raid as during it, as they attempted to collect or move unexploded submunitions. This was a clear indication of things to come.

It is also worth noting that the incendiary bombs, used to devastating effect by both Britain and Germany, would be classified as "submunitions", despite the fact that most contained no high explosive. Such weapons, with pyrotechnic or inert fillings, pose little or no post-conflict threat to civilians and should be eliminated from the categories to be regulated.

Evolution

The next major use of submunitions was during the Vietnam War, where both mines and impact-fuzed bomblets were dropped by the millions. The worst affected country was Laos, where more than 9 million bomblets were believed to remain unexploded. As in the Second World War, these were air-delivered in cluster bombs, had mechanical impact fuzes and used a fragmentation effect. Many of those used in Laos were 'spin-armed' and contained an 'all-ways acting' fuze designed to operate at any impact angle; this type of fuze is particularly dangerous if it fails to function as intended.

Some 40 years after they were dropped in Laos, these bomblets are still causing casualties on a regular basis. Some of the very same types were used recently by Israel in Lebanon. Not surprisingly, a very high proportion failed to function, and were left unexploded across vast areas of the country.

The Cold War

During the Cold War, NATO felt that the primary threat came from massed Warsaw Pact armour. The design of submunitions shifted to meet this threat, incorporating anti-armour shaped charges into the warhead. Since the high explosive charge would also shatter the bomblet casing, it was easy to create an additional fragmentation effect for use against personnel and materiel in the open. These bomblets were therefore called "dual-purpose", meaning that they incorporated both anti-armour and fragmentation effects.

Penetrating the relatively thin top surface of a Cold War era tank required only a small charge, meaning that anti-armour bomblets could be very compact. This led to the development of small cylindrical bomblets that could be packed end to end and fitted into artillery shells. Known as the Dual-Purpose Improved Conventional Munition (DPICM) this design quickly gained popularity within the military, and was then adapted for use in mortar bombs and rockets. DPICM account for the vast majority of submunitions currently stockpiled.

While the Warsaw Pact also used anti-armour bomblets, they preferred types which were heavier (typically 2.5 kg), air-delivered and capable of far greater armour penetration. These were supplemented by fragmentation bomblets for attacking troops and lightly armoured targets.

Cold War era cluster munitions were used in several recent conflicts, including by the US and UK in the Gulf War and by Russia during their occupation of Afghanistan. Large numbers remain in the inventories of many countries.

The Gulf War

The Gulf War of 1991 saw extensive deployment of both air and ground-delivered cluster munitions, and is probably the best example of their successful use. Iraqi units were both devastated and demoralised by the continual submunition strikes that occurred throughout the "air war" phase of the campaign. The fact that the "ground war" lasted only four days and met very little resistance was largely attributed to the effect of cluster munitions. Since the Iraqi forces were mainly in open desert, there was little impact on civilians, although there were many post-conflict casualties among allied troops and clearance workers.

The Gulf War also highlighted the excessive failure rate of these munitions. More than 95,000 unexploded bomblets were recorded during the clearance of the US sector of Kuwait, which probably represented around one quarter of the unexploded ordnance throughout the whole country. While it is hard to establish a definitive percentage, it was clear that a large proportion of both air-delivered anti-armour bomblets and artillery/rocket-delivered DPICM had failed to function as intended.

Despite proof of their high failure rates and inevitable post-conflict threat, these same designs would then be used again in Kosovo, Afghanistan and the invasion of Iraq. In Kosovo alone, it is believed that the BLU-97 "Combined Effects Munition" caused more fatalities than all of the land mines put together. This is largely due to the presence of an "all-ways acting" secondary fuze; the cause of so many casualties in Laos.

Iraq and sensor-fuzed submunitions

In addition to the DPICM and BLU-97, the Iraq conflict of 2003 saw the first major use of "sensor-fuzed" submunitions, designed to target and defeat armoured vehicles. An electronic fuze, which requires an electrical power supply, allows a sensor-fuzed munition to use a `reserve battery', which is only activated when the weapon is deployed. The short life span of the battery means that the power source soon becomes unavailable to initiate the warhead, providing a reliable method of "self neutralisation". This does not make the weapon "safe", but it does at least minimize the chance of it functioning through accidental disturbance.

Lebanon

The Lebanon conflict of 2006 saw the first large-scale operational deployment of DPICM fitted with Self-Destruct (SD) fuzes. The Israeli M85 was used alongside older US DPICM of the types deployed during the Gulf War. While the SD fuzes did not achieve the reliability claimed by the manufacturers, they did have a significantly lower failure rate than the non-SD types. This showed that the incorporation of a SD device was beneficial, but was not a solution to submunition contamination. It also illustrated the substantial difference between results obtained during testing, and the reality seen during operations.

Conclusions

Right from their earliest use, it was clear that certain types of submunitions had the potential to cause unacceptable post-conflict harm to civilians. The evolution of their design, employing larger numbers, a variety of delivery means and greater lethality has since increased that danger.

While some types (such as pyrotechnic and sensor-fuzed submunitions) pose relatively little risk, many of the designs with proven post-conflict impact continue to be used. The problem centres primarily on mechanically fuzed, impact initiated high explosive bomblets, and it is these that require urgent regulation.

Speaker's Summary:

CLUSTER MUNITIONS: HISTORICAL OVERVIEW OF USE AND HUMAN IMPACTS

Simon Conway

"As they descended, the outer casings were released allowing a number of small anti-personnel bombs to be scattered over a large area. Some exploded on impact with the ground, some landed in the trees and were suspended by their wings on the branches of trees, others caught on guttering, telephone wires, chimney stacks. The public was asked to report any sighting but under no circumstances attempt to move them. There was complete terror among the population of the town for many months."

This eyewitness account is of a German Luftwaffe cluster strike against the **UK port town of Grimsby** in June 1943. SD-1 and SD-2 Butterfly bombs were also dropped by the Luftwaffe on airfields in the Mediterranean and on Soviet artillery positions in the Kursk salient. A US Army report into the battle of Kursk claimed that the butterfly bombs "*proved devastating to troops with no overhead cover, such as those manning the Soviet anti-tank guns"*.

From the very beginning we see use of cluster munitions against a broad range of targets including concentrations of civilians and we are reminded of their devastating impact on personnel both at the time of use and afterwards due to their high dud rate.

The most significant event in the development and subsequent use of cluster munitions was the **Korean War –** when American military might was challenged by an enemy that was technologically inferior but with inexhaustible supplies of manpower. US commanders confronted the nightmare of seeing their forces over-run by hordes of enemy soldiers. The result was a revolution in anti-personnel weapons with an emphasis on the production of large quantities of fast-flying lethal fragments over a wide area.

The production of fragmentation effects is a common feature of cluster munitions, and in the development of the weapon we see a move away from cast iron sheaths, to pre-scored steel and ball bearings.

The war that cluster munitions were designed for was over by the time they had reached the stage of mass production, but they were ready in time for the **Vietnam War** and they were used in massive quantities, not only in response to “human wave” attacks, but also in a largely unsuccessful attempt to hamper and interdict enemy movement, lines of communications and logistic stores. Harrison Salisbury of the New York Times wrote in 1967: "*I suppose that the guavas and pineapples [as certain submunitions were called] were dropped by our planes on what they presumed were anti-aircraft batteries, radar installations, or military outposts. The trouble was that in heavily populated North Vietnam they inevitably took a toll among civilians."*

The place most devastated by cluster munitions was the **Plain of Jars in Laos**. A UN Adviser in Laos, George Chapelier wrote that “By 1968 the intensity of the bombings was such that no organised life was possible in the villages”. An official US Information Service Survey based on interviews with refugees from ninety six Plain of Jars villages, reported that: *“95% of the persons that responded to the question said their village had been bombed. Two thirds had seen someone injured by the bombs; in 80% of such cases the victim was a villager”*.

The many tons of cluster submunitions expended in Indochina left a legacy of destruction and unexploded ordnance with which the people of those countries will have to contend for many years to come. Handicap International has identified 6,000 confirmed cluster munition casualties from Vietnam and Laos since the mid-1970s. However, for Vietnam alone they suggest that the true total could be upwards of 30,000 based on statistics from the Vietnamese Ministry of Social Affairs. Casualties are still occurring, more than 30 years after they were used.

It was also in Vietnam that the first combined effects munitions were used. The MK118 Rockeye bomblet contains a shaped charge – an inverted copper cone – that is converted into a molten jet on detonation and is sufficient to penetrate armour. The use of plastic tail fins which shatter on explosion gave rise at the time to the charge that this was an anti-personnel weapon designed to produce undetectable fragments. As well as an anti armour capability, an incendiary element zirconium was added to the BLU 61. It is typical for more recent submunitions such as the BLU97 and the BL755 to combine all effects: blast, fragmentation, incendiary and armour penetration.

Following the use of cluster munitions in Vietnam, we see the first significant proliferation of cluster munitions.

In a 2005 report "Cluster Munitions in **Lebanon"**, Landmine Action provided an account of the consequences resulting from the use of US-manufactured cluster munitions during Israeli attacks in 1978 and 1982, including public outcry, the admission of a secret agreement outlining restrictions on use which was ignored by Israel and a subsequent eight-year ban on sale of cluster munitions to Israel by the US.

In **Western Sahara**, US manufactured cluster munitions were also used by Moroccan forces against displaced Saharawis. The major bulk of the 160,000 refugees currently in Algeria became refugees after Moroccan planes and artillery bombed IDP camps, settlements, transit routes and waterholes in the interior in 1976. Casualties continue to this day.

Like the Americans in Vietnam, Soviet Forces in **Afghanistan** conducted massive bombardment of the countryside, killing and injuring civilians, driving people from their homes, creating millions of refugees who fled to neighbouring countries, and destroying crops and livestock. Like Vietnam, Afghanistan served as a proving ground for new weaponry, in this case the use of cluster warheads for the BM-27 surface-to-surface rocket system. The sheer numbers of submunitions abandoned by Soviet forces following their withdrawal from Afghanistan, including a huge cache at Bagram airbase, hint at the amount that were used.

In 1982, the UK used BL755s during the **Falklands conflict** against Argentine positions and it is reported that the only civilian casualties of the conflict were caused by cluster munitions. Until very recently, the UK Government had claimed failure rates for the BL755 ranging between 5% and 7%, but a calculation based on the number of bombs dropped and the number of submunitions cleared by British military disposal teams working on the island after the conflict suggests a minimum failure rate of 9.6%. This doesn’t take into account the witness stories of the Argentineans dumping wheel barrows full of them into the water, or the fact that a cluster strike on the promontory at Goose Green remains uncleared. A reluctance to acknowledge the true failure rates of cluster munitions is another consistent theme in the history of cluster munitions and it persists to this day.

The **1991 Gulf War** witnessed the extensive deployment of cluster munitions by Coalition forces and the number of submunitions used is estimated at over 13 million. There is significant evidence of very high failure rates. In a study of ERW for the ICRC, Colin King estimated that *“the most common air-dropped submunitions used might have failed to explode on impact some 20-40 per cent of the time due to an insufficient drop height and its use on soft sand.”*

The Gulf War saw extensive use of the Multiple Launch Rocket System, the so-called “grid square removal machine”. Adopting the Soviet tradition of multiple surface-to-surface rockets, the twelve-tube launcher fires one rocket from each tube. The M26 rocket contains 644 M77 submnunitions, that’s 7728 submunitions spread over an area of 200,000 square meters at the press of a button.

A report by Human Rights Watch noted that by February 2003, 1,600 civilians had been killed and 2,500 injured in Iraq and Kuwait as a result of air and ground launched cluster munitions. It is also worth noting that cluster munitions are reported to have been responsible for most of the 191 casualties incurred during the post-conflict ordnance clearance operation. Seven US troops were killed in a single incident whilst stacking unexploded BLU-97s. Cluster munitions from the 1991 Gulf War are still being cleared on the Iraq-Kuwait border.

Use of cluster munitions in **Croatia** resulted in a case currently before the International Criminal Tribunal for the former Yugoslavia. Milan Martic currently stands accused of war crimes as a result of the shelling of the commercial district of Zagreb with Orkan rockets fitted with cluster warheads on 2nd and 3rd May 1995.

In the first and second **Chechen wars**, cluster munitions were extensively deployed by Russian forces in populated areas, particularly in and around Grozny. Human Rights Watch reported that *"Russian Forces have indiscriminately and disproportionately bombed and shelled civilian areas", causing heavy civilian casualties"*. In a cluster strike on Grozny market in 1999, witnessed by colleagues from The HALO Trust, 137 people were killed and many more injured.

The **Eritrea-Ethiopia conflict** of 1998-2000 is one of the few conflicts in which cluster munitions were used and the combatants were relatively evenly matched in terms of military technology. In June 1998, Eritrean aircraft dropped cluster bombs in the town of Mekele, Ethiopia hitting a school. Fifty three civilians were killed and a further 185 were injured in the attack. Ethiopian aircraft also dropped cluster munitions on civilians in Eritrea. On 9th May 2000, UK manufactured BL755s were dropped on a camp for displaced people. In the period after the attack, 420 unexploded submunitions were disposed of by The HALO Trust.

These weapons were not used for the job for which they were designed. These incidents cause concern about the extent of cluster munition proliferation internationally and the potential for them to be misused on a much larger scale in the future unless prompt action is taken.

In May and June 1999, allied forces dropped over 240,000 submunitions (BLU97s, BL755s and MK118 Rockeyes) on **Kosovo**, causing more than 75 deaths and injuries to civilians at the time of use and at least 152 post-conflict casualties, and resulted in $30 million worth of expenditure on post-conflict clearance. Cluster munitions are still being cleared in Kosovo. Political and military figures presented the use of cluster munitions as being used against a narrow set of targets only in very specific circumstances, but NATO bombing records indicate that they were a weapon of convenience used against a wide range of static and mobile targets with very little evidence of effectiveness.

Political figures also sought to downplay the anti-personnel effects of the weapons. The British Foreign Secretary argued that *"There is a use of cluster bombs but in this context what that refers to are antitank weapons. Each of the clusters in them is designed to penetrate heavy armour.*" This is misleading, firstly because the submunitions used were combined effects munitions causing antipersonnel fragmentation and not exclusively anti-armour, and secondly because it suggests that targets were primarily armour when in fact this was not the case.

Politicians also demonstrated some confusion concerning the effect of drop-height on failure rates.

According to former US President Jimmy Carter, *"As the American led force has expanded targets to inhabited areas and resorted to the use of anti-personnel cluster bombs, the result has been damage to hospitals, offices and residences of a half dozen ambassadors, and the killing of hundreds of innocent civilians."*

Partly in response to the problems identified in Kosovo, in 2003 States Parties to the CCW agreed Protocol V on Explosive Remnants of War. However, humanitarian organisations and some States have consistently maintained that this law is insufficient to tackle the excessive problems caused by cluster munitions. According to John Flanagan, former head of the UN Mine Action Coordination Centre in Kosovo:

"Experience showed that submunitions were likely to cause multiple casualties (including fatalities), and that a high proportion of victims were under the age of 18. This was because the shape and colour made them appear "toy like", and the destructive power and lethality of the weapons was completely misunderstood. One of the key lessons learned from Kosovo was that submunitions needed to be singled out for particular attention as part of the awareness campaign. To simply include cluster bombs as part of a generic UXO threat was not sufficient, given the threat they posed."

It is worth noting that the adoption of the protocol coincided with an increase in scrap prices in South East Asia which saw a marked increase in casualties, particularly amongst children – a reminder of the limits of post-conflict remedial measures to address humanitarian concerns.

The United States dropped over 248,000 submunitions over **Afghanistan** between October 2001 and March 2002, causing casualties at the time of use, exacerbating an already established problem with cluster munitions. An ICRC database contains records of 462 people killed and injured by cluster munitions from 1998 to June 2006, of these 47% were children. The Journal of the American Medical Association reported a *"pronounced increase in injuries from cluster bombs in October 2001"*.

During major hostilities in **Iraq** in 2003, both air delivered and artillery delivered cluster munitions were extensively used and, as with the other conflicts mentioned, significant concerns were raised about the humanitarian consequences. Human Rights Watch criticized the use of cluster munitions in civilian areas by US and UK forces. Although use of air-dropped cluster munitions in populated areas had decreased in comparison to past wars, ground launched cluster munitions, including M26 rockets fired by MLRS, were used extensively in populated areas and this resulted in hundreds of casualties.

On March 31 2003, a cluster munition strike documented by Human Rights Watch in the neighbourhood of Nadir in the City of al-Hilla in Iraq killed 38 civilians and injured 156. In this case, we believe cluster munitions were used against a populated area in an attempt to suppress anti-aircraft fire during a move by US helicopters.

Although UK officials characterized the use of these weapons as targeted *"against dispersed Iraqi military forces in the open or on the periphery of built up areas"*, specific criticism has been made regarding their use in the al-Kubra and al-Tunnuma neighbourhoods of Basra.

In one of the incidents on 23rd March 2003, a British cluster strike hit the engineers' district of Basra. A 13 year old boy suffered acute injuries to his bowel and liver, and a fragment lodged near his heart. A 26 year-old carpenter who was sleeping in a nearby house died. Ten relatives who were sleeping elsewhere in the house suffered shrapnel injuries. Across the street, the cluster strike injured three children.

In response to these criticisms, defence officials have stated that a far greater weight of high explosives would have to be delivered to achieve the same probability of destroying enemy forces when using blast bombs instead of cluster munitions.

The real issue of significance is that in order to destroy a point target, such as an artillery or anti-aircraft position, an area weapon is being used. The fact that the weapon disperses anti-personnel fragmentation throughout the area also means that personnel within the area have become part of the target. The target area had been enlarged as a consequence of the design of the weapon.

A far better alternative to using an area weapon against a point target is to improve the accuracy of delivery of a point weapon against a point target.

Post-conflict assessments of casualties in Iraq vary. In June 2003 Iraq Body Count noted that between 200 and 372 people were reported to have been killed by cluster munitions in the media sources they track. The following month UNICEF reported that *"more than 1,000 children have been injured by weapons such as cluster bombs, dropped by coalition forces"*.

As with Chechnya and Afghanistan, problems of access and security mean that it has not been possible for NGOs and International Organizations to research the full extent of civilian harm either during or after attacks.

Given the clear evidence of a consistent pattern of humanitarian harm associated with cluster munitions and given that the users of cluster munitions have done virtually nothing to contribute to an understanding of the civilian harm caused by cluster munitions – that job has fallen on NGOs, international organizations, news reporters and affected individuals – it would be a mistake to consider the extensive use of Israeli cluster munitions against populated areas in Lebanon in the summer of 2006 as an aberration.

As many as 4 million cluster munitions may have been fired at **Southern Lebanon**. Israel used a combination of air, artillery and rocket delivered cluster munitions, from Vietnam era BLU-63 bomblets, which failed in huge numbers, to M77 submunitions fired by MLRS, which also failed in huge numbers causing civilian casualties, to the latest artillery delivered M85 submunitions fitted with self-destruct fuzes, which also failed in significant numbers. This despite claims of the manufacturers, Israeli Military Industries, who say *"Our testing suggests that the M85 cluster device has a hazardous dud rate of 0.06%...our M85 devices are the most environmental friendly in the world because they leave no environmental hazardous behind and only minute of hazardous duds."*

According to the UN Mine Action Coordination Center: *"We can state categorically that we are finding large numbers of unexploded M85 submunitions that have failed to detonate as designed and failed to self-destruct afterwards. In effect these submunitions have failed twice. These M85 submunitions are even more dangerous than other types because the self-destruct mechanism makes them more problematic to deal with."*

By December 2006, the UNMACC had recorded over 890 individual strike sites. Research undertaken by Landmine Action in September 2006 confirmed that in 60% of cases the centre of the strike was within 500 metres of the centre of a residential area.

As well as the casualties, cluster munitions have had a harmful effect on the economy of southern Lebanon. There is widespread contamination of tobacco fields, olive and fig groves and citrus plantations. The citrus plantations of the Tyre pocket were particularly badly hit.

As in Kosovo, a massive clearance operation costing millions of dollars is underway in Lebanon, and development practitioners are increasingly questioning why aid budgets should be spent on clearing up after wars, when there is no clear commitment to prevent such tragedies happening in the future. The repeated use of inaccurate and unreliable submunitions, despite ample evidence of a consistent pattern of harm, represents a failure by governments to take seriously their responsibility to protect civilians during times of conflict.

Key user States claim that cluster munitions are legal. If that is the case then the consistent pattern of civilian harm caused by these weapons, of which the casualty toll in Lebanon is only the most recent example, make it clear that international law is inadequate.

DISCUSSION

The presentations of this session inspired discussions on the types of munitions categorized as cluster munitions, the features of the weapon, how they have been used in past conflicts and questions about fuzes and their failure rates. Many of these issues would also be the subject of more detailed presentations and discussions later in the meeting.

As to what kinds of weapons are cluster munitions, one participant asked if a system which dispersed submunitions directly from an aircraft, without the aid of a separate canister or container, would be included in the current understanding of "cluster munitions". In response, Mr. King highlighted that, presently, the terms "cluster munitions" and "submunitions" are too broad, non-technical and would cover weapons which are not really part of the problem. They may also exclude certain systems which should be part of the current work, such as those which dispense submunitions directly from aircraft. He noted that definitions of these terms are a crucial element in future discussions on cluster munitions. A presentation in Session IV of the meeting is meant to look at the question of definitions in greater detail.

One military participant underlined that there is not a generic "cluster munition", as these weapons include a variety of systems which have been developed over time for different types of targets and different types of missions. Yet, he felt there was a need to discuss the targeting of military objectives in populated areas. Such use is certainly covered by current international humanitarian law, but it remains an issue that has to be dealt with seriously. He also reminded the audience that collateral damage is also caused by unitary munitions and that one must compare the consequences of unitary munitions with those of cluster munitions. Finally, he thought that many of the civilian casualties mentioned in the presentations referred to situations in which cluster munitions had not been used in a lawful manner, but were, for example, circumstances in which the weapons had been fired against civilian targets.

Mr. King agreed that there is clearly a military role for cluster munitions and one could not ask the military to carry out missions with one hand tied behind its back. He also emphasized that one must strike a balance between military need and humanitarian impact. A sensible approach might be to identify and control those cluster munitions which cause unacceptable harm and which are badly designed, thereby still allowing the military to do what they are asked in difficult circumstances.

In the view of one participant, two major factors affect the number of potential casualties. One is whether cluster munitions are used properly. The second factor is the design and failure rate of the technology used. He asked the panel which of these have a more important role concerning the impact of cluster munitions on civilians.

For Mr. Conway both factors contribute to the problem. He noted, however, that further research is needed in some areas, and that NGOs do not have sufficient resources to investigate all the necessary details. He felt that governments have a role to play in this area, but that most are unwilling to invest the time and money to examine the relevant issues. One specific area where he felt that additional research is needed is the military utility of cluster munitions. This is because war had changed significantly since cluster munitions were first developed and introduced into the stocks of the armed forces. In his view, how cluster munitions are or can be used in today's conflicts must be examined.

Mr. Conway also offered his thoughts on the problem of attacking targets in populated areas and the argument often heard that the military would need to use a greater amount of unitary explosives in order to achieve the same effect as cluster munitions. He thought that there were many instances in recent conflicts in which cluster munitions had been used in urban areas against point targets (e.g. anti-aircraft positions or individual artillery positions). As cluster munitions are area weapons, the result was that civilians in the area had unnecessarily become part of the target.

Several participants enquired about the fuzes on submunitions and the different types currently being used. One participant asked whether submunitions with short delay or sensor fuzes are considered "submunitions which are initiated on impact", a phrase used in some definitions.

Mr. King responded that the majority of fuzes today are impact oriented. However, there are submunitions with short time delay fuzes which put off the start of detonation. Others have longer delays and use pyrotechnics or a timing device to postpone detonation. The presence of such submunitions is a way to deny access to certain areas. He stressed that it was important to capture these features in any future definition of cluster munition. Mr. King proposed that it might be useful to speak of 'a munition which is initiated on impact'. This would cover short time delay fuzes, but it would exclude any "smart" submunitions not 'initiated on impact'.

A participant sought clarification on a point made by one of the speakers that electronic fuzes were more reliable than mechanical fuzes. Without entering into the technical details, Mr King explained that this was due to the ability to test electronic fuzes more thoroughly. In testing, it is impossible to check every single mechanical fuze, so sample lots are taken and tested. With electronic fuzes, each and every electronic circuit can be tested and this provides a better indication that the circuits are functioning properly. These factors help increase the reliability of electronic fuzes versus mechanical fuzes.

It was asked if there are differences between the design and characteristics of the submunitions used in aircraft dispensers, bombs, artillery shells and rockets. The questioner thought that the submunitions in bombs, artillery shells and rockets would be smaller and that this could be the cause of higher failure rates. Mr. King answered that submunitions could be designed in any number of ways, irrespective of the 'carrier'. They could be highly sophisticated or quite simple.

He noted however, that factors other than size are relevant. For example, an aircraft dispenser would release submunitions at high velocity, and ensuring their proper functioning would pose different technical challenges than the release of submunitions from an artillery shell.

Debate arose on how the speakers arrived at the various failure rates of submunitions cited in their presentations. Mr. King indicated that in many cases the military itself had released figures on the number of cluster munitions delivered in a conflict. For example, figures were available following the 1991 Gulf War and after the conflict in Kosovo (Serbia). By combining figures with statistics from the demining community on the amount of submunitions cleared in a particular strike area, one could ascertain an approximation of the failure rate. He felt that there was a high degree of confidence that the reliability rate was certainly not 99.9%, as this would have indicated a very high number of cluster munitions used.

There was discussion as to what was meant by the term "smart" submunition. It was the view of both presenters that a self-destruction mechanism alone does not make a submunition "smart". From a technological point of view, self-destruct mechanisms could help make submunitions more reliable. However, recent conflicts have shown that submunitions fitted with these mechanisms have not prevented the occurrence of large numbers of unexploded submunitions. In their view, the term "smart" would mean that a munition contains a complex electronic system such as a target sensor capacity, also called an "intelligent fuze function". This would provide the submunition with a capability to be directed at specific targets. Such capability did not exist in the 1960s but has only become feasible in recent times. Yet as one participant underlined, many countries may not have the resources to afford such precision guided munitions.

A participant asked if the trend towards submunitions with self-destruction mechanisms is based on a desire to prevent future humanitarian problems caused by large numbers of unexploded submunitions. In the view of Mr. King, self-destruct mechanisms are incorporated for two reasons. The first is to lessen the impact on civilians. The second is to better protect one's own forces which often need to go through or occupy an area where submunitions have been dropped. In conflicts in which non-selfdestructing submunitions have been used, troops have referred to these weapons as "a loser" due to the casualties they inflicted on their own troops.

There was also discussion on the issue of hazardous duds versus non-hazardous duds. Mr. King explained that some munitions contain a reserve battery, which, after a certain time, will no longer have sufficient electrical energy for the munition to explode. In a technical sense, these munitions may be considered non-hazardous duds. However, such duds can remain a danger for the civilian population, as they will be present in a field, for example, and may be accidentally detonated. In response to a query on the life of batteries, a participant explained that two types of batteries are normally used: thermal reserve batteries and liquid reserve batteries. Because of their technical differences, the former have a rather predictable lifespan, whereas the latter have a much longer lifetime and in this sense can be less predictable.

One participant thought that the industry needs to be more involved in the discussions on the technical aspects of cluster munitions and the search for a solution. Several others, however, felt differently believing that military and policy makers need to define user requirements of the weapon and present these to the industry. Not, as was often the case on other weapons issues, the other way around.

One participant expressed his amazement that experts are still discussing failure rates and other technical aspects of cluster munitions nearly seven years after the ICRC's Nyon Expert Meeting on Explosive Remnants of War (2000). He argued that the real agenda has changed and that many would see these endless technical discussions as insensitive and even irresponsible. In his view, what is needed now is political action, and the critical issue is to establish political objectives based on standards derived from the historical human impact of cluster munitions. Once these objectives and standards are established, the technical and military adjustments will have to follow. He questioned the need to spend significant time discussing failure rates because, in his view, even a submunition with a 0% failure rate would not prevent some of these weapons from being prohibited.

In response to this, Mr. King indicated that, while he agreed in general terms, he thought that one could not avoid speaking about technicalities at this stage. Many of those involved in the cluster munitions issue do not really know what they are speaking about and there is a danger that if the issue was put directly into a political arena, one could end up with a legal text full of loopholes and misunderstandings which would lead to different interpretations of what is meant, for example, by cluster munition, submunition, bomblet, etc.

Mr. Conway said that he believes it is crucial to find a consensus on the overall goal to be achieved through the work on cluster munitions, and that this will help in developing proper definitions. His understanding of the negotiation of treaties is that definitions tend to be among last items agreed upon by States.

Another participant felt that the cluster munitions issue does not need to be treated as a political matter. He thought that a direct move to a political approach would be the wrong way through which to balance the military and humanitarian aspects of this problem. He underlined the importance of this meeting as a forum to share information on the various aspects of cluster munitions and as a firm foundation for any work in this area.

A participant reacted by stating that for him, the purpose of this expert meeting was to know what had to be contained in a new treaty on cluster munitions, and not to discuss whether or not something had to be done. He believed that there is no dispute as to the negative humanitarian impact of these munitions. He also questioned whether the military has shown and documented the need and utility of the weapon, and wondered if there were instances, either for a specific engagement or for a conflict as a whole, in which the military could not have accomplished its objective without cluster munitions. The lack of evidence that cluster munitions are a "force winner" was also highlighted by other participants who took the floor during the discussion.

SESSION II - MILITARY ASPECTS AND POSSIBLE ALTERNATIVES

Speaker's Summary:
SURVEY OF CLUSTER MUNITIONS PRODUCED AND STOCKPILED
Mark Hiznay

This presentation is an introduction to the wide variety of cluster munitions currently available. The functional characteristics of these munitions as well as estimates of the numbers in current stockpiles are included in the presentation.

Limitations

- The information contained herein reflects the best publicly available information known to Human Rights Watch.
- It does not include munitions that contain biological, carbon fiber, chemical, electronic, illuminant, incendiary, kinetic rod, landmine, nuclear, obscurant, or propaganda submunitions.
- The information in this briefing paper is fragmentary and likely incomplete, particularly regarding non-Western weapon systems. For example, 122mm BM-21 *Grad* multiple launch rockets.[1]

Global Overview of Production and Stockpiling

- A total of 34 States are known to have produced over 210 different types of airdropped, surface-launched, or submarine-launched cluster munitions including projectiles, bombs, rockets, missiles, and dispensers.
- Cluster munitions are stockpiled by at least 75 States and have been used in at least 24 countries and disputed territories.[2]
- At least 13 States have transferred over 50 types of cluster munitions to at least 60 other States as well as non-State armed groups (NSAG).
- Focus of this presentation is on three categories:
  - Impact and time delay fuzed bomblets;
  - Dual purpose improved conventional munitions (DPICM);
  - Sensor fuzed weapons.

Magnitude of Stockpiles

- Existing cluster munitions contain billions of individual explosive submunitions.
- Reported active US stockpiles in 2005 contained nearly 730 million submunitions; stockpiles in Russia and China likely to be comparable in scale.

[1] The following 65 countries possess 122mm rockets (26 of these countries are not included in this briefing as stockpiling cluster): Afghanistan, Algeria, Angola, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Burundi, Cambodia, Cameroon, China, Congo, DR Congo, Croatia, Cuba, Cyprus, Czech Republic, Ecuador, Egypt, Eritrea, Ethiopia, Georgia, Greece, Hungary, India, Iran, Israel, Kazakhstan, North Korea, Kyrgyzstan, Lebanon, Libya, Macedonia, Mali, Mongolia, Morocco, Mozambique, Myanmar (Burma), Namibia, Nicaragua, Nigeria, Pakistan, Peru, Poland, Romania, Russia, Rwanda, Slovakia, Sri Lanka, Sudan, Syria, Tajikistan, Tanzania, Turkey, Turkmenistan, Uganda, Ukraine, the United Arab Emirates (UAE), Uruguay, Uzbekistan, Vietnam, Yemen, Zambia, and Zimbabwe.

[2] In addition, unconfirmed reports cite use of cluster munitions in Angola, Colombia, Kashmir, Nagorno-Karabakh, Pakistan, Sri Lanka, Turkey, and Yemen.

- Compared to 1994 totals, this is a 20-30 percent reduction in US stockpiles.
  - At least 220 million submunitions contained in five types of artillery projectiles were removed from service since 1994; at least 8 million were exported.[3]
  - A total of 9,621 tons of cluster munitions are being destroyed in fiscal years 2006 and 2007 at a cost of USD$16.2 million.[4]
    - Other countries experiencing similar situations as Cold War stockpiles age and become unsafe to use.
- An example of stockpile ratios, based on US and German stockpiles:
    - 93 percent are DPICM;
    - 6 percent are impact or time delay fuzed bomblets;
    - Less than 1 percent are sensor fuzed weapons;
    - Other NATO and Western countries may have similar percentages but for other countries there is no reliable public information.
- Most stockpiles of cluster munitions would consist of millions to tens of millions of submunitions.

Examples of Proliferation

- The US sold 7,087 early-generation cluster bombs (CBU-52, CBU-58, CBU-71), containing 4 million submunitions, to Greece, Jordan, Morocco, Saudi Arabia, Singapore, and Thailand between 1970 and 1995.[5]
- The US transferred over 61,000 surplus artillery projectiles, containing 8.1 million submunitions, to Bahrain and Jordan between 1995 and 2001.[6]
- BL-755 cluster bombs produced in the UK have been exported to, or ended up being possessed or used by, 15 other countries.[7]
- The former Yugoslavia was the first non-Western country to produce and export DPICM.[8]
- Cluster munitions of Soviet origin are reported to be in the stockpiles of 22 countries.[9]

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[3] Systems retired from US inventory include 105mm M-444 ICM, 155mm M-449, M449A1 DPICM, 8-Inch M404 ICM and M509A1 projectiles. US Army Material Systems Analysis Activity, "Unexploded Ordnance (UXO) Study," April 1996, p. 7.

[4] Department of the Army, "Procurement Programs, Committee Staff Procurement Backup Book, Fiscal Year 2008/2009 Budget Estimates, Ammunition Procurement, Army," February 2007, p. 704.

[5] US Defense Security Assistance Agency, Department of Defense, "Cluster Bomb Exports under FMS, FY1970-FY1995," November 15, 1995, obtained by Human Rights Watch in a Freedom of Information Act request, November 28, 1995.

[6] US Defense Security Cooperation Agency, Department of Defense, "Excess Defense Article database," undated, http://www.dsca.osd.mil/programs/eda/search.asp (accessed November 28, 2006).

[7] BL-755 cluster bombs are reported to be stockpiled by Belgium, Eritrea, Germany, India, Iran, Italy, Netherlands, Nigeria, Oman, Pakistan, Saudi Arabia, Serbia, Switzerland, Thailand, and the UAE. Belgium, Germany, the Netherlands, Portugal, Switzerland, and the UK have subsequently disposed of or are in the process of disposing of some or all the weapons.

[8] US Defense Intelligence Agency, *Improved Conventional Munitions and Selected Controlled-Fragmentation Munitions (Current and Projected) DST-1160S-020-90*, 8 June 1990, partially declassified and made available under a Freedom of Information Act request.

[9] Cluster munitions of Soviet origin are reported to be in the stockpiles of Algeria, Angola, Bulgaria, Croatia, Cuba, Egypt, Hungary, India, Iran, Iraq, Kazakhstan, North Korea, Kuwait, Libya, Moldova, Mongolia, Poland, Romania, Slovakia, Sudan, Syria, and Yemen.

Impact and Time Delay Fuzed Bomblets

- Largest diversity of types, but not largest number of submunitions.
    - Mostly air delivered munitions.
    - Varying types, shapes, functions, and effects (fragmentation, blast, runway cratering high explosive antitank, combined effects, etc.).
  - ▪ Common types include RBK series bombs and KMG-U dispensers of Soviet origin.
    - Generally do not have a self-destruct mechanism.
    - Time delay fuzes no longer common but recently considered by some NATO and other countries as an alternative to antipersonnel mines.
    - Manufacturers often claim a submunition failure rate of 2–5 percent; explosive ordnance disposal personnel frequently report rates of 10–30 percent (e.g. Southeast Asia, Kuwait, Kosovo, Lebanon).
- Used in conflicts in 20 States and disputed territories.[10]
- Produced by 20 States and stockpiled by at least 68 States.[11]
- Some models removed from service due to age or reliability concerns by some countries, but other countries maintaining stocks of same models.
    - BL-755 bomb
  - ▪ A total of 52,500 bombs were produced containing 7.7 million submunitions.[12] An average submunition dud rate of 6.4 percent based on 15 years of tests.[13]
  - ▪ Removed: Belgium, Germany (676,200 submunitions), Netherlands, Portugal, Switzerland, UK (536,550 submunitions).
  - ▪ Retained: India, Iran, Italy, Nigeria, Oman, Pakistan, Saudi Arabia, Serbia, Thailand, United Arab Emirates (UAE).
    - Rockeye bomb
  - ▪ Removed: Argentina, Australia, Canada, Denmark, France, Norway.
  - ▪ Retained: Egypt, Greece, Honduras, Indonesia, Israel, Jordan, South Korea, Morocco, Oman, Pakistan, Spain, Thailand, Turkey, US.

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[10] Impact and time delay bomblets have been used in Afghanistan, Albania, Cambodia, Chad, Chechnya, Croatia, Eritrea, Ethiopia, Falkland Islands (Malvinas), Iraq, Kuwait, Laos, Lebanon, Saudi Arabia, Sierra Leone, Syria, Tajikistan, Western Sahara, former Yugoslavia (including Serbia, Montenegro, and Kosovo), and Vietnam.

[11] Countries that produce and stockpile impact and time delay bomblets: Argentina, Brazil, Chile, China, Egypt, France, Germany, Iran, Iraq, Israel, North Korea, Pakistan, Russia, Serbia, Slovakia, South Africa, Spain, Sweden, UK, and US.
Countries that stockpile impact and time delay bomblets: Algeria, Angola, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Croatia, Cuba, Czech Republic, Eritrea, Ethiopia, Georgia, Greece, Guinea, Guinea-Bissau, Honduras, Hungary, India, Indonesia, Italy, Japan, Jordan, Kazakhstan, South Korea, Libya, Moldova, Mongolia, Morocco, Netherlands, Nigeria, Oman, Poland, Portugal, Romania, Saudi Arabia, Serbia, Sudan, Syria, Thailand, Turkey, Turkmenistan, Ukraine, UAE, Uzbekistan, Yemen, and Zimbabwe.

[12] Jane's Air Launched Weapons, Issue 44, March 2004, p. 469.

[13] DLO Secretariat, DLO Andover, "Response to Landmine Action question," Reference 06-02-2006-145827-009, March 27, 2006.

- Submunitions in CBU-87 bombs in stockpiles:[14]
    - US (22 million);
    - Saudi Arabia (243,000);
    - Egypt (154,000).
- Submunitions in Rockeye bombs in stockpiles:
    - US (14.5 million);
    - Turkey (816,000);
    - Egypt (321,000);
    - Morocco (198,000);
    - Thailand (124,000).

Dual Purpose Improved Conventional Munitions (DPICM) without Self-Destruct

- Impact fuze without self-destruct, dud rates of 3-23 percent based on US testing.
- Widespread in very large quantities in global stockpiles.
    - Including non-State armed groups, e.g. Northern Alliance & Hezbollah
- Used in conflicts in eight countries and disputed territories.[15]
- Produced by 18 States and stockpiled by at least 31 States.[16]
    - 128,000 M26 rockets, containing 82 million M-77 DPICM, were produced by MLRS European Producer Group.
    - There are 10 different cluster munition warheads containing DPICM for 122mm rockets manufactured by six countries.[17]
    - Belgium, Germany, and Netherlands have stopped production.
    - Removed from service by Belgium, Canada, Germany (partial), Netherlands (partial), and UK.
- Submunitions contained in M-26 rocket stockpiles:
    - US (238 million);
    - UK (27.8 million, being destroyed);
    - Germany (23.8 million);
    - Israel (11.6 million);
    - Netherlands (10 million, removed from service);
    - Egypt (at least 1.9 million);
    - Bahrain (at least one million).

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[14] Sources for stockpile figures presented: For US cluster munition stockpiles, Office of the Under Secretary of Defense (Acquisition, Technology and Logistics), Department of Defense, “Report to Congress: Cluster Munitions,” October 2004; for UK stockpiles of cluster munitions, House of Commons Hansard Written Answers for Oct 10, 2006, Column 656W; for German cluster munition stockpiles, Actiongrouplandmine.de, “Cluster Bombs and Cluster Munitions: A Danger to Life,” December 2005, for recipients of US cluster munition exports, US Defense Security Assistance Agency, Department of Defense, “Cluster Bomb Exports under FMS, FY1970-FY1995,” November 15, 1995, obtained by Human Rights Watch in a Freedom of Information Act request, November 28, 1995 and data from US Defense Security Cooperation Agency, Department of Defense, “Notifications to Congress of Pending U.S. Arms Transfers,” “Foreign Military Sales,” “Direct Commercial Sales,” and “Excess Defense Articles” databases, http://www.dsca.osd.mil/ (accessed November 28, 2006)

[15] DPICM submunitions have been used in Albania, Bosnia and Herzegovina, Croatia, Iraq, Israel, Kuwait, Lebanon, and Western Sahara.

[16] DPICM are produced and stockpiled by Argentina, Brazil, Bosnia and Herzegovina, Bulgaria, China, Egypt, Greece, India, Iraq, Italy, Singapore, South Korea, Pakistan, Russia, Slovakia, Spain, Turkey, and US. States that stockpile DPICM submunitions include Bahrain, Croatia, France, Germany, Iran, Israel, Japan, Jordan, Morocco, Netherlands, Saudi Arabia, Serbia, and Sudan.

[17] China, Egypt, Italy, Poland, Russia, and Slovakia produce 122mm cluster munition rockets.

- Submunitions contained in stockpiles of DPICM with self-destruct projectiles:
    - US (402 million);
    - Netherlands (15.3 million, two-thirds removed from service);
    - Bahrain (5.1 million);
    - Jordan (2.5 million);
    - UK (1.5 million, being destroyed).

DPICM with Self Destruct (SD)

- Impact fuze with pyrotechnic, electro-mechanical, or mechanical SD mechanism.
    - Manufacturer Israel Military Industries claims a hazardous dud rate of 0.06 percent for M85 SD DPICM.[18] Use in Lebanon of this type raises questions about this claim.
    - Submunition dud rates 1.3-2.3 percent based on Norwegian and UK testing of over 20,000 M85 SD DPICM.
    - The rate of unexploded ordnance (UXO) resulting from US production qualification testing of M30 guided MLRS rockets and M101 submunitions conducted in November 2006 totaled 6.5 percent and the submunition dud rate averaged 1.5 percent.[19]
- Used in Iraq and Lebanon.
- Produced by 13 States and stockpiled by at least 20 States.[20]
    - 60 million M85 SD DPICM produced by Israel Military Industries.[21]
    - Quantities of SD DPICM in stockpiles quite small compared with DPICM without SD.
- SD DPICM submunitions contained in stockpiles of 155mm projectiles:
    - Germany (8 million in DM642 and DM652 projectiles);
    - UK (2.9 million in L20A1 projectiles);
    - Norway (at least 2.6 million in DM642 and DM662 projectiles).

Sensor Fuzed Weapons (SFW)

- Designed in the 1980s to sense and engage individual armored vehicles without creating a wide-area antipersonnel effect.
    - Features include advanced active and passive sensors (infrared, millimeter wave radar) and the ability to loiter above a target area.
    - SFW sometimes carry only two submunitions, instead of several hundred.
    - Very small number of different types.
        - US stockpiles 30,990 BLU-108 submunitions, which is 0.0004 percent of its submunition stocks.
- First and only use in combat in Iraq in 2003.[22]

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[18] Israel Military Industries, Artillery Ammunition Directorate, "Australian Senate Standing Committee Inquiry into Cluster Munitions (Prohibition Bill)," Letter ART-1035.07, February 14, 2007.

[19] Office of the US Army Product Manager, Precision Fires Rocket and Missile Systems, "Briefing on Precision Guided Missiles and Rockets; Self Destruct Fuze Efforts," February 2007, Slide 7.

[20] States that produce and stockpile DPICM with self-destruct mechanisms include Argentina, France, Germany, India, Israel, South Korea, Poland, Romania, Singapore, South Africa, Switzerland, UK, and US. States that stockpile DPICM with selfdestruct mechanisms include Austria, Denmark, Finland, Greece, Italy, Japan, and Norway.

[21] Presentation to the 48th Annual Fuze Conference by Mike Hiebel, Alliant TechSystems, and Ilan Glickman, Israel Military Industries, "Self-Destruct Fuze for M864 Projectiles and MLRS Rockets," Charlotte, North Carolina, April 27-28, 2004, Slide 9, http://www.dtic.mil/ndia/2004fuze/hiebel.pdf (accessed November 28, 2006).

[22] In Iraq in 2003, the United States used air-dropped CBU-105 Sensor Fuzed Weapons and surface-launched M898 Sense and

  - Time of attack and post conflict impacts unclear.
- SFW are being researched, produced, or acquired by at least 14 countries.
  - Bonus (artillery-delivered): France, Sweden, US.
  - SMArt-155 (artillery delivered): Germany, Greece, Switzerland, UK, US.
    - Over 11,000 DM702 SMArt-155 have been produced so far by a European production consortium.[23]
  - MOTIV-3M (artillery, rocket, and air delivered): Russia, India, Kuwait.
  - Meteor (rocket-delivered): Poland.
  - CBU-97/CBU-105 (air dropped): US, Greece, South Korea, Oman, Turkey.

Trends and Future Developments

- Efforts to improve accuracy of carrier munition coming into operational use.
  - Wind Corrected Munitions Dispenser (WCMD) and guided MLRS.
- Submunitions used as unitary munitions.
  - Brilliant Anti-armor Technology (BAT) submunitions originally designed for delivery by rocket are being individually used by drones (Viper Strike).
- Multipurpose munitions that can be configured in unitary or submunition modes.
  - Textron's "Clean Lightweight Area Weapon" (CLAW).

Humanitarian Concerns

- Cluster munitions were designed for use in the Cold War, specifically for the largescale bombardment of massed tank and infantry formations.
  - Gulf War 1991 (estimated 50 million submunitions).
  - Serbia/Kosovo 1999 (295,000 submunitions).
  - Afghanistan 2001/2002 (248,000 submunitions).
  - Iraq 2003 (1.8 to 2 million submunitions).
  - Lebanon (4 million submunitions).
- Many cluster munitions in stockpiles are nearing or are beyond the end of their storage life and will become dangerous to use.
  - Prolonged storage may also increase the number of unexploded submunitions left after use.
- Technical approaches to improve reliability only address the post-conflict problem and do not address the wide area effects of the weapon.
  - Self-destruct devices can give militaries a false impression that cluster munitions are safe to use in populated areas.
  - Failure rates in combat conditions are invariably higher than those established by production acceptance or surveillance testing regimes.

Reflections and General Observations

- Vast majority of cluster munitions are not sophisticated weapons.
  - Most are demonstrated to be unreliable and inaccurate.
  - Neither dispensers nor submunitions are guided.

Destroy Armor (SADARM) 155mm artillery projectiles for the first time.

[23] "ATK/GIWS SMArt 155 Sensor Fuzed Munition Succeeds in UAE Desert Tests," Alliant TechSystems press release, January 10, 2005, http://atk.mediaroom.com/index.php?s=press_releases&item=471 (accessed June 7, 2006).

  - Many stockpiles are approaching or well beyond 20 years of storage life.
  - Most not designed to reduce or minimize UXO, as the weapons were not intended to be used in areas to which users would be returning.
- "Newer" models such as DPICM have foreseeable high failure rates.
  - Self-destruct has not proven to be sufficiently effective or reliable solution.
- Governments must demonstrate that any particular cluster munition does not cause unacceptable harm; burden of proof lies there, based on the demonstrated harm of so many types of cluster munitions in so many settings.

Speaker's Summary: The Continuing Military Utility of Cluster Munitions Ernest Carbone (presented by Stephen Olejasz)

Introduction

Armed conflict is of course extremely distasteful to civilized society – but it must be recognized that its occurrence, hopefully infrequent, is the inevitable consequence of mankind's inability to accept differences or to resolve them by peaceful means. With this in mind, it is necessary to recognize the need for weapons that are necessary to assist in the defeat of an enemy, in conformity with the law of armed conflict.

The family of cluster munitions was developed to assist in the defeat of an enemy. The family has many members, because war has many conditions and environments that must be addressed in its prosecution. The continued military utility of cluster munitions has been called into question of late. This paper summarizes the author's presentation[24] discussing the basic issues related to cluster munitions' utility on the battlefield.

Discussion

Why were cluster munitions developed? To defeat an enemy with minimum exposure of our own forces; to enable responsive action when time was of the essence; to provide an economy of force; and to protect friendly forces. Cluster munitions are but one tool in a commander's operational tool-box to enable him to address and prosecute the tasks he will be given. Like any tool, they have a primary purpose, something they are best suited for, and like any device they can be misused. But that doesn't mean the tool or device should be banned from use. Rather, ensuring an educated user will aid in future employment being correct with the device's purpose. The potential target list for cluster munitions is extremely large, leaving out only things like individual combatants; sole, exact or small point targets; and, hardened or buried targets. The targets for cluster munitions are complex in nature due to their distribution over the terrain, to their relative position to one another or to the number of types of targets within an area be they stationary or moving. Further, the target could be a facility, a storage area, a depot area or just a geographic area of interest.

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[24] 18 April 2007, "The Ongoing Military Utility and Role of Cluster Munitions", The International Committee of the Red Cross (ICRC) Expert Meeting on Cluster Munitions, Montreux, Switzerland

Because cluster munitions can be effective against the large population of systems, personnel, and facilities of interest to a military force, there are a number of types of cluster munitions with varying performance characteristics and capabilities. The first two points of the presentation are 1) all cluster munitions are not the same; they have differing technologies, capabilities and intended missions and targets, and 2) due to these differences their military value should be assessed by weapon system and not across the entire family.

The remainder of the presentation addresses the factors, process, legal, operational, and humanitarian concerns and physical science calculations that go into matching a weapons to a target. It starts with identifying legal targets – meaning that the target has military value. The commander's intent and mission are developed mindful of, and assessed against, the law of armed conflict, the rules of engagement, and the humanitarian/collateral damage concerns (both pre- and post-attack by a team of specialists). Each has independent priorities and command structures. The final decision to select a weapon type to employ against a target as part of a mission is a complex process and the result of many machines and many people. A number of misconceptions on the continued military utility of cluster munitions, possible alternatives, cluster munitions accuracy issues vs. unitary warhead or precision weapons, and misconceptions on cluster munitions' characteristics are countered with facts taken form operational use, military training, and the laws of physics.

Summary

Cluster munitions are weapons of war that address serious target sets that exist today and in the future. The numerous types of cluster munitions demonstrate their importance in armed conflict, and they provide the commander significant operational flexibility to counter numerous threats. We can responsibly plan and regulate their use due to our knowledge of key variables in their employment. As with all weapons or tools of mankind, they will evolve with time, along with our capability to absorb more information, control more factors, and account for more unpredictability while still engaging the enemy in a responsive, flexible manner and with weapons of war that minimize humanitarian concerns. Responsible development, employment and remediation in accordance with the rules in the law of armed conflict and the rules and principles in the CCW Protocol V are essential.

DISCUSSION

The survey of cluster munitions produced and stockpiled was widely considered to be useful by providing insights into the current situation and the scale of the possible future challenges in terms of proliferation, humanitarian impacts and stockpile destruction[25]. However, virtually all of the questions and comments in this session concerned the presentation on the ongoing military utility of cluster munitions.

Several participants remarked that the morning presentations had provided a great deal of specific information on the effects of cluster munitions. In contrast, the presentation on the ongoing military utility and role of cluster munitions remained theoretical and lacked concrete

[25] In response to one question it was confirmed that the stockpile quantities which had been presented included both "active" and "inactive" cluster munition stocks.

examples. A number of participants posed the question of how, if current law is adequate and meticulously applied in practice, the results described in the morning session could have occurred. For some, this led to the conclusion that there is a fundamental problem with the weapon itself. For others, it meant there is a need for new rules to regulate or prohibit the weapon.

Several questions referred to the 2006 report by Handicap International which indicated that 98% of casualties from cluster munitions have been civilians. If this is true, it was argued, what degree of military benefit had been obtained to justify this level of civilian suffering? The same questioner also asked how the military records and weighs such casualties.

In response, Lt. Col. Olejasz suggested that it was unclear whether the figure of 98% civilian casualties referred to those killed and injured from unexploded cluster munitions or casualties occurring at the time of use. He went on to say that there is a concern among the military about civilian casualties. On the one hand, a certain level of civilian casualties, however regrettable, can be expected to occur in warfare. On the other hand, remedial efforts through clearance and in the framework of the Protocol on Explosive Remnants of War must play an essential role in reducing the impact of UXO, including submunitions, on civilians.

A participant with military experience questioned the suggestion made in the presentation that cluster munitions could play a "force protection" role. Although this might be a role for landmines, it was not, in his view, seen as relevant for cluster munitions. Lt. Col. Olejasz replied that in some circumstances cluster munitions are used to seal gaps against enemy forces when such forces are mobile and not static.

A recurrent theme in the discussions was whether restrictions on the use of cluster munitions would inevitably lead to an increase in the quantity of unitary munitions used against the same military objectives, as some advocates of cluster munitions have claimed. One participant questioned this assumption and argued that such use, if it led to similar quantities of ordnance being used, would be just as objectionable as the use of cluster munitions, particularly in populated areas. Another highlighted the fact that the use of 500 unitary munitions with a 5% failure rate would result in 25 pieces of UXO, whereas the use of 500 cluster munitions (containing for example 202 submunitions each) with the same failure rate would result in 5050 unexploded submunitions.

In reaction to some of these comments, a military participant emphasized that a wide range of factors, including the importance of the military objective, possible civilian casualties, the availability of other weapons, the potential UXO problem, and the rules of international humanitarian law on targeting, are all taken into account before taking a decision to use cluster munitions. Lawyers placed within the military command system serve as a "check" on commanders to ensure that the best decision is made in each case. Admittedly, he said, this is a challenging endeavour, and one must strive to implement the rules and hold accountable those who do not.

Another military participant took a different view and suggested that if all of the precautions just described are taken and the results are still as disturbing as what has been seen "from Laos to Lebanon", then only two conclusions are possible. One is that there is a fundamental problem with the weapon. The other is that the level of civilian casualties historically caused by cluster munitions is simply inevitable and we will "just have to get used to it".

It was argued by one participant that the controls in existing international humanitarian law have failed to protect civilians and that there should be a presumption that all use of cluster munitions against military objectives in populated areas was disproportionate and illegal. Another participant questioned whether cluster munitions have a high military utility on the basis of an official US report on the 2003 Iraq war, which referred to these weapons as "battle losers". It was also highlighted that, in many cases, there are alternatives to the use of cluster munitions, including the use of ground troops. According to this participant, a trade-off between higher civilian casualties and avoiding the military casualties which ground forces might entail is not considered acceptable.

A participant contested suggestions that cluster munitions do not pose a clearance problem that is significantly different from other munitions and that they may, in fact, be easier to clear due to the fact that they often lay on the surface. These beliefs are incorrect, he stated. In his experience working in clearance operations, cluster munitions pose a complex clearance challenge due to their instability, the variety of environments in which they are found (in trees, buried in soft ground, in destroyed buildings, rivers, etc.) and their varying technical characteristics. He stated that although they are intended to be accurate when used, they often fail to hit their target due to the variety of forces which act upon submunitions both when released and while in flight.

One participant pointed out that cluster munitions account for 40% of the munitions stock of his country. Its decision to enact a moratorium and forego their use had not been easy or taken lightly. Nonetheless, it was judged that, given their humanitarian consequences, such a decision was necessary.

A questioner asked for more specific information on where, historically, cluster munitions "have worked" in eliminating military objectives which couldn't be taken out by other means. Another participant questioned whether the "anti-armour" role they were originally designed to serve was still relevant in light of improvements in the armour of tanks and armoured vehicles. To these points, one military participant suggested that there are examples of situations where these weapons have worked, but he was not prepared to present them at this meeting. Another participant highlighted that nowadays cluster munitions would be effective only against "some tanks and some armoured vehicles".

It was noted by a participant that the scenarios described in this session were often interventions in foreign countries or overseas actions by multinational forces. In his view, a different set of calculations are necessary when one is considering the issue primarily from the viewpoint of national defence and the deterrence of attack. Another participant stated that these weapons do have a role to play against specific targets, but that, given what is known about their possible effects, it is necessary "to calculate a thousand times" before deciding on their use.

Speaker's Summary:

BENCHMARKS FOR ALTERNATIVE MUNITIONS TO CLUSTER MUNITIONS
Sensor Fused Area Munitions (SEFAM)
(Information on elements of the German draft Protocol on Cluster Munitions)

Germany is of the view that, in a mid-term perspective, cluster munitions should be replaced by alternative munitions that pose a significantly lower risk to the civilian population while meeting the necessary military requirements. On a national basis, Germany has already taken concrete steps in this direction, including the renunciation of cluster munitions with a dangerous dud rate above one percent.

Alternative munitions must fulfill the key provisions of the CCW Convention, *i.e.* to avoid indiscriminate and excessively injurious effects, while maintaining the balance between humanitarian goals and military requirements. “Alternative munitions” (pursuant to Article 2, paragraph 8; Article 4 paragraph 3; and the Technical Annex of the draft CCW Protocol on Cluster Munitions) have to meet the following main benchmarks:

I. Three Benchmarks for Alternative Munitions to Avoid Indiscriminate Effects

1. Reduced amount of explosive submunitions

Recent conflicts have shown that the very high number of submunitions contained in the dispensers of cluster munitions caused significant hazards for the civilian population. In addition, submunitions had an unacceptably high rate of dangerous duds. Against this background, one benchmark for alternative munitions is the drastic reduction of the amount of explosive submunitions contained in each dispenser. It is obvious that if the amount of explosive submunitions contained in one dispenser is reduced, for example from 1,000 to 10, the numerical basis for dangerous duds is minimized and the probability of the civilian population being affected is thus significantly reduced.

2. Accuracy

With regard to the protection of civilians, accuracy is an additional and important tool. Therefore, it is essential that a second benchmark require the submunitions of alternative munitions to be effective only within a pre-defined target area. Any effect of submunitions outside the pre-defined target area must be excluded.

3. Discriminating effect

In addition, a third benchmark aims to ensure that submunitions of alternative munitions are technically capable of detecting a pre-defined target. This discriminating effect can be achieved through the use of radar, infrared and/or radiometric-sensors, which are integrated into the submunition. This benchmark would work as follows: after deployment by a ground-based or airborne system, the dispenser releases the submunitions. At this moment, the fuse of the submunition is armed and the detection sensors are activated. The detection phase ends when a defined height above ground level is reached. When the confidence level of the sensors is such that target detection is assured, the fuse of the submunition stays in the armed position. If, however, the confidence level of detection is not satisfactory, self-destruction will be activated at a given height, destroying the submunition. As a consequence, there will be almost no attack, no dangerous dud on the ground, and, significantly, less need for post conflict clearance operations.

II. Three Benchmarks for Alternative Munitions to Avoid Excessively Injurious Effects

The benchmarks for alternative munitions to avoid excessively injurious effects cover submunitions with explosives (benchmarks 1 and 2) and those which do not include explosives (benchmark 3).

1. Reliability

The first benchmark for the avoidance of excessively injurious effects by alternative munitions can be achieved through setting an adequate reliability factor. A reliable alternative munition means that the submunitions with explosives are ensured to have a test based dangerous dud rate below one percent. This benchmark presupposes that the requirements relating to reliability are included in the quality standards agreed with industry in the framework of the procurement process.

2. Technical safety features

The second benchmark adds technical features such as self-destruction, selfdeactivation and/or self-neutralization to the submunitions of the alternative munition. However, there is no guarantee that these technical features will effectively minimize the dud rate of submunitions; they can only serve as a supplementary safety feature. Their limited ability to increase safety has to be weighed against their considerably high cost.

3. No explosives within the submunition

The third benchmark for the avoidance of excessively injurious effects is the use of submunitions that do not include explosives. One example is “Kinetic Energy Rods”, where the dispenser contains metal rods, which engage military targets through kinetic energy. The advantage of this type of alternative munition is that, post impact, the rods are inert. Consequently, there is no hazard after the conflict involving ERW for the civilian population and clearance operations are not needed.

III. Three Benchmarks for Alternative Munitions to Maintain the Capability to Engage Area Target Categories

Current types of cluster munitions are designed to engage three main categories of targets: 1) the so-called point and single target; 2) small area targets; and 3) large area targets. At present, there is no cluster munitions model designed to engage all three target categories. Against this background, it has to be assumed that this will also apply to alternative munitions. Alternative munitions will therefore have to exist in various types (models?) in order to be able to engage all three aforementioned target categories.

IV. Cumulative and Optional Benchmarks

The political, humanitarian and military benchmarks for alternative munitions are partly cumulative and partly optional. Below is a summary of the main elements.

A. Four Cumulative Benchmarks for Alternative Munitions

Alternative munitions have to meet all of the following four requirements:

1. Drastic reduction of the amount of submunitions with explosives;
2. Enhanced reliability by minimizing the dangerous dud rate. The standard should limit the test based rate of dangerous duds to less than one per cent;
3. Improved accuracy to limit the effects of the submunitions to the pre-defined target area only; and
4. Maintaining the capability to engage the three categories of area targets.

B. Three Optional Benchmarks for Alternative Munitions

In addition to the cumulative benchmarks, alternative munitions should meet the following optional requirements:

1. Using submunitions without explosives in order to avoid duds;
2. Ensuring a discriminating effect by having adequate target-detecting sensors integrated into the submunitions with explosives; or
3. Fitting an effective sensor to the dispenser of such alternative munitions, whose submunitions does not include explosives.

V. Definition of Alternative Munitions

On the basis of the above, alternative munitions could be defined as follows:
"Alternative munitions" means an air or ground launched dispenser that contains submunitions. Each alternative munition is designed to eject submunitions over a predefined area target. The dispenser:
(a) which includes a sensor for accuracy, contains submunitions that are inert post impact, or
(b) contains less than ten submunitions with explosives, each of which includes multiple sensors with a capability to detect a target.
Alternative munitions could be described as “Sensor Fused Area Munitions" or SEFAM.[26]

[26] As other speakers elaborated on reliability, accuracy and adequate Rules of Engagement and other crucial elements for possible alternatives to cluster munitions, there are no details incorporated.

VI. Examples of Present and Future Alternative Munitions (SEFAM)

Four present and future examples of alternative munitions, which meet the aforementioned benchmarks, are introduced below according to the category of area target each is designed for.

1. To engage **point- and single targets**. The 155 mm-artillery munition “DM 702” includes less than ten submunitions in its dispenser, which drastically reduces the numerical basis for duds. The submunitions contain up to 10 explosives. Each submunition is equipped with a discriminating capability through three different sensors based on different target signatures: active radar, radiometric, and infrared. This alternative munition is available in the stocks of armed forces.
2. To engage **small area targets**. The “Sensor Fused Artillery-Munition (SMArt)” is similar to the aforementioned. Accuracy is ensured by a “Guided Missile Launch Rocket System”. This alternative munition could be available for armed forces in the coming years.
3. To engage **large area targets**. The munition "Kinetic Energy Rods” contains submunitions without explosives, which excludes the basis for duds. Accuracy is ensured by a “Guided Missile Launch Rocket System”. This alternative munition could be available for armed forces in the next decade.
4. To engage **large area targets**. The munition M26 “Kinetic Energy Rods” also contains submunitions without explosives. The munition is based on the MLRS Rocket M26. Major necessary modifications include replacing the payload with “Kinetic Energy Rods” and enhancing accuracy by adding a “Guided Missile Launch Rocket System”. This alternative munition could be available for armed forces in the next decade.

DISCUSSION

A number of participants welcomed the presentation of possible alternatives which they felt to be constructive and a way to inspire thinking on new ways forward. Participants requested a number of clarifications, and several were sceptical about the specific technologies proposed.

An important clarification provided by Commander Frisch was that the standards suggested in the German text were meant to apply cumulatively (i.e. the number of munitions in a unit must be ten or fewer and have a maximum of 1% dangerous duds and the systems must contain self-destruct features). Participants were informed that a 1% failure rate referred to the rate at the point of testing and that further consideration needs to be given to the entire life-cycle of the munition.

This led to considerable discussion on the concept of "dangerous duds". Many participants felt that all duds must be considered dangerous and that the level of danger posed by a dud cannot be easily determined in the field. Several pointed out that a great deal depends on how the dud is (or is not) handled. If put into a foundry as scrap metal, even unarmed duds will explode, highlighting the relevance of the interaction between civilian communities and the UXO around them. In one national test, unarmed duds were placed in a cement mixer causing a number of these duds to explode. Such action was intended to recreate activities during reconstruction or the effect of a submunition being in the back of a truck. It was acknowledged by all participants in the discussion that there are no "safe" duds.

One participant was highly critical of any system which relies on self-destruction technology. Although he agreed it is attractive in principle, his experience in the clearance of munitions had demonstrated that it simply does not work and that it could not be considered a solution on its own.

Many questions were posed about the alternative of using "kinetic energy rods" to cover area targets. Would these be intended for use against materiel or personnel? What would be the proposed size and velocity of these rods? From which material would they be constructed? Would they have an environmental impact? How long would it take to develop such systems? Commander Frisch clarified that, in preliminary tests, the anti-personnel impact of such rods had been less severe than the injuries caused by a 9 mm bullet. He also indicated that further details on such systems would be presented at the next meeting of the CCW's Group of Governmental Experts in June 2007.

SESSION III – TECHNICAL APPROACHES TO MINIMISING THE HUMAN COSTS OF CLUSTER MUNITIONS

Speaker's Summary:
ACHIEVING HIGH RELIABILITY RATES ON CANNON FIRED CLUSTER MUNITIONS
Philipp Marti

The Swiss Army has two types of cluster munitions in its inventory. The first is the 155m artillery cargo projectile with/without base bleed carrying 49, 63 or 84 grenades. The second is the 120mm mortar cargo projectile with 32 grenades or submunitions. The Swiss Army does not have any ground to ground rocket artillery or missiles, cluster bombs, or other type of cluster ammunition. As it also does not have close air support for ground-attack or any ground to ground long range or deep attack capabilities, the 155mm cluster ammunition plays a very important role on the army's defence strategy.

Switzerland started evaluating a Dual-Purpose Improved Conventional Munition (DPICM) incorporating a shaped charge and an enhanced fragmentation case for use against material and personnel targets in the first half of the 1980's. The goal was to complement the traditional but limited high explosive ammunition.

According to the Swiss Army's mission and its rules of engagement, DPICM or any other kind of ammunition has to fulfil specific safety requirements. Such ammunition is foreseen to be used inside the borders of the country for self defence purposes only. In any type of ammunition with a conventional fuze system, a certain number will malfunction. To reduce significantly the number and the hazard of armed and dangerous duds, an improved fuze system is required by the Swiss Army, e.g. a double fuze system with self destruction possibility.

A conventional ignition system consists of a very sensitive primary detonator activated by a firing pin initiating a sensitive lead charge bringing the main charge with the secondary high explosive to function. An additional primary detonator no. 2 with a pyrotechnic delay guarantees to neutralize the primary charge and to disrupt the ignition chain. The additional detonator is located in a slider which is moved into the firing chain by acceleration force after the ejection of the grenades from the projectile body and to unscrew the firing pin fitted on the drag ribbon.

Technical tests conducted according to common and special standards (e.g. Swiss Test Operation Procedures, Mil-Std 810) during the product evaluation phase have shown that the 155mm and 120mm cargo projectiles fulfil the Swiss Army's requirements.

During roughly 20 years of technical testing of ten and fifteen year old ammunition (production acceptance and stockpile test firing), more than 1200 projectiles and 70'000 grenades have been analysed, tested and fired in all kinds of configurations and test conditions. The self-destruction mechanisms bring approximately half of the dangerous grenades on the ground to detonation leaving behind less than 2% duds. Of these, less than 0.2% can be considered dangerous or a potential hazard by contact.

Speaker's Summary: DESIGNING FUZES

Lee Springer

Fuzes or fuze systems are part of an ordnance system and perform four basic functions. Fuzes keep the ordnance in a safe condition between storage and deployment. They arm the ordnance. They sense a target, and effect functioning by the initiation of an explosive train.

This explosive train is a basic concept of ordnance design. Main warhead explosive charges are relatively insensitive to normal external stimuli. This allows unfuzed ordnance to remain relatively hazard free.

Fuzes are unique military devices that need to be made more significantly robust than many other pieces of military equipment to survive a wide variety of extreme conditions related to storage, logistics, deployment and tactical use. Specifically for submunitions, they must also withstand the forces imparted by the deployment technique. Fuzes also need to utilize the deployment and tactical conditions in order to remove safing features and provide arming.

Many people fail to recognize that fuzes must operate properly under the conditions of launch or deployment, through the tactical flight environment, and sometimes through target impact. Fuzes need to be made very rugged to perform as intended.

The fuze design process starts with weapon system requirements, including reliability, stated in terms of safety, performance, logistics and operational specifications. These requirements are delegated to parts of the weapon like the fuze.

Fuze designers develop detailed designs based on the delegated requirements. As the design matures, prototypes and test samples are fabricated and tested. Problems encountered are investigated, analyzed and corrected prior to retesting. This process is often repeated several times before a product is determined to have met the requirements. The fuze then is subjected to an extensive qualification test in a variety of test conditions to assure that it meets the requirements. With the data from this testing, a decision is made to enter initial production.

When quality production is demonstrated, fuze lots, are placed into the inventory and periodically tested to determine if there is safety or performance degradation.

Military requirements tend to be far more numerous and demanding than the technology or funding permit. Funding, the availability of personnel, and the availability of technology to satisfy the military needs are realities within which the designers must manage. Thus as the design matures, the least expensive alternative that meets the requirements is selected.

In considering the cost, keep in mind that higher reliability and better precision generally costs more. This cost includes sophisticated and high quality components. Also, to validate higher reliability requires more testing and inspection which increase costs.

Fuze designers are challenged to provide a design that satisfies all requirements. This includes evaluating technology to determine if it will satisfy requirements and if it can be developed into products within the time and funds allotted. The designer must also infuse into the design, the ability to survive the conditions found in logistics, loading, deployment, and encountered tactically. The designs must also provide the required performance, must fit within the allotted space and must also meet mandatory regulatory requirements that may not be specified by the war fighter.

Testing is a significant challenge. End product tests are required and are made as comprehensive as feasible but cannot economically consider all use conditions. If there are failures, the products may not be recovered for analysis and if they are, they are heavily damaged, making investigation of the failure extremely difficult. Therefore, investigating failures is also a challenge. Testing for aging is also a challenge because there is no test that can adequately substitute for actual aging.

During production, the design must not pose an uncontrollable hazard and must be made so that it can be tested and inspected in the most economical fashion. It also has to be producible at rates that provide expected economies of scale and satisfy war fighter quantity needs.

In use, the fuze design must be such that the war fighter can easily understand its operation, and employ the ordnance, while EOD personnel can provide for proper disposal.

So then what causes UXO? Some UXO exist because of what I call duds; items that didn’t work although they were properly deployed and intended to work. The reason that these fuzes do not work are complex and varied. I’ve put them into four categories, manufacturing, tactical, logistics and design. Another cause of UXO comes from mistakes in deployment. Also, for submunitions, if the carrier fuze fails to function, submunition UXO can result.

The first effort in improving the existing products is determining the cause of failure. This is hard enough for items like automobiles, and televisions, so you can imagine the difficulties with these one-shot devices that are severely damaged when recovered.

Once failure mechanisms are discovered, designs improvements can be made and phased into fuzes being produced. Design improvements can improve marginal designs, make products more producible, or more robust, and we can make them better or less expensive with modern technology. We can also improve the production process. The basic limits are maintaining the weight and space of the unimproved product and keeping changes affordable. We won’t be able to affect all tactical, logistic and deployment causes.

Fuzes in stockpiles that need improvement pose additional problems. Disassembly, modification and reassembly expose unmodified components to the risk of damage. Such damage is a potential cause of duds.

The self destruct fuze for the DPICM is an example of a design improvement. The original fuze, the M223, was analyzed for causes of failure. The major contributors were addressed and significant reductions in duds were achieved. Unfortunately, the higher reliability came with increased cost and couldn’t be improved enough to meet the desired high levels. With the self-destruct self-sterilization mechanism, system function rates over 99% have been demonstrated.

This mechanism is completely independent of the primary initiating function and provides for complete detonation of the submunition if the fuze arms, or destruction of the fuze if it doesn’t arm. The sterilized submunition is far less hazardous to handle and dispose. Unfortunately, these higher system function rates and added features come with increased cost.

This demonstrates that technology can reduce the number of UXO and the hazard associated with UXO. It’s not an easy task but it is feasible. But higher reliability and added features come with increased cost so affordability is a consideration in implementing these design changes.

In summary, fuzes are unique military devices that are made complex to satisfy the military need, in the world-wide military environment. The process for designing fuzes isn’t new but designing fuzes isn’t a simple task. UXO is unavoidable but we can address some causes if we know them, others we can’t correct. Fuze designs are a balance between military need and the limits on resources available to the military. Making the perfect fuze is unrealistic. Finally, when UXO occurs we can look to technologies that reduce their numbers and render them less hazardous.

DISCUSSION

Following these presentations, questions focussed on the concept of "dangerous" and "non-hazardous duds", the testing, reliability and degradation of submunitions, and the costs associated with improvements to these weapons. Several participants also sought an explanation as to why large numbers of Israeli M85 submunitions failed to explode during the conflict in Lebanon.

During the discussion on dangerous and non-hazardous duds, a number of participants observed that, from a humanitarian perspective, such a distinction is of little value and that participants needed to be careful when talking about "safe duds". It was noted that, with regard to clearance of weapons and as a matter of safety, all UXO must be treated as dangerous. It was also pointed out that a non-hazardous dud can easily become armed and dangerous when it is manipulated. While the difference may be useful for technical and testing reasons, it fails to take into account an analysis of how and why people interact with ordnance.

In response to these points, Mr. Marti agreed that all UXO must be considered dangerous and removed by specialists. Civilians must be made aware of this and ways must be found to encourage civilians not to interact with ordnance. He agreed that nonhazardous duds can become dangerous if manipulated. He also added, in reply to a question on whether the results of tests conducted by the Swiss Army were similar under battlefield conditions, that Switzerland tries to re-create a variety of situations and conduct all kinds of tests, including tests under different temperatures and vibrations.

Mr. Springer concurred with many of the points made by participants. In his view, all UXO is hazardous and should only be removed by competent authorities. He agreed that less hazardous duds are not, in and of themselves, a solution to the cluster munitions problem. However, he felt that they could be considered part of a response because they lessen some of the danger. He noted that important aspects to addressing the problem also included the proper application of international humanitarian law and rules of engagement by the armed forces.

Mr. Springer made a clarification on his use of terminology. He distinguishes the term "unexploded ordnance" (UXO) from the specific term "dud" as not all UXO on the ground are duds. A munition which was not properly deployed cannot be expected to function as intended. Such a munition would not be a dud, but rather a piece of UXO. All UXO must be considered as hazardous and removed by competent authorities.

Concerning the degradation of munitions, the panel was asked which munition components degrade over time (e.g. fuzes, self-destruct mechanisms), whether it is possible to make predictions on the decrease in reliability of submunitions, at which level of unreliability during testing would a particular submunition no longer be stored or fit for use, and is it possible to establish a maximum limit on the operational service for cluster munitions.

Mr. Marti responded that it is important to check the pyrotechnics, plastics, and components such as rubber rings. Plastics and rubber rings could be easily replaced, but this is not the case for pyrotechnics. Through sampling, Switzerland tests pyrotechnics every year. If there are problems with their functioning, fire testing is done. Reliability in this area needs to be at least 98%, and, if they fail to reach this level, they are often disposed of.

Mr. Springer added to this response by highlighting that other components, such as lubricants and glues, must also be checked as they too are sensitive to degradation. He went on to say that predicting reliability in this area is difficult, as products are often manufactured under different conditions. Removing a weapon from active service will vary from weapon to weapon. But, specific testing requirements are established when a weapon is built, and those same requirements are used to determine whether it should be taken out of service.

Concerning a maximum shelf life for munitions, Mr. Marti explained that some high explosive shells are still in Swiss stocks even though they were manufactured 35 years ago. For cluster munitions, Switzerland normally expects a life span of approximately 20 years. The oldest cluster munitions currently in its stocks are 15 years old and, after recent tests, it is believed that these munitions will last beyond their 20 year life span and perhaps remain in stock for as long as 25 years. If deterioration is found, the weapons would be disposed as it is too expensive to make any modifications to such ammunition.

Mr. Springer was asked if he could clarify a point made in an earlier presentation that the US was having difficulty meeting its national policy requirement of having a maximum failure rate of 1% for new submunitions. He was also asked about the challenges in achieving such a requirement, and the kind of self-destruct mechanism the US was using.

Mr. Springer replied by pointing out that the policy of the US is to reach a 99% or higher reliability for its submunitions produced after 2004, and that the US is meeting this requirement. He indicated that there are several ongoing programs to produce fuzes that attain this reliability, and to find a possible replacement for the MLRS. The technology to achieve this is an electro-mechanical system. The US is also examining several pyrotechnic systems. He is aware that there are some potential problems with pyrotechnics, and that experts are being very conservative in their assessment of them.

Several participants noted that improvements to the design of munitions are often costly. A 1993 US study was cited which estimated that retro-fitting US submunitions following the First Gulf War would have cost US $11 to $13 billion. However, the work was never pursued and this highlights that political will and resources are needed to achieve such goals. It was also pointed out that money would be saved on the clearance of UXO, and one participant asked if this factor was taken into account by governments.

Mr. Springer recognized that there are often limitations on resources, but that countries like the US are taking steps to make munitions less of a post conflict danger. He indicated that the US does consider the costs of clearing when justifying the expense to retrofit current ammunition.

Finally, Mr. Marti was asked whether he had any perspectives on the high failure rate of the M85 submunition in Lebanon. Also, as Switzerland had M85 submunitions or a variation of them in its stocks, whether it had made any modifications to the weapon?

Mr. Marti indicated that he could not speak of the situation in Lebanon, as he had no technical information on the situation or any knowledge on how Israel used M85. In his view, the Swiss design was safer in light of the modifications made to the weapon. Concerning these modifications, Mr Marti explained that Switzerland had purchased this munition 4 times, and that there had been several different forms of collaboration. Some projectiles were bought directly from Israeli Military Industries but according to Swiss specifications. In some cases, the components were made in Switzerland and the bomblets assembled in Israel. Generally, modifications were made to the pyrotechnics.

Speaker's Summary: UNEXPLODED CLUSTER BOMBS AND SUBMUNITIONS IN SOUTH LEBANON: RELIABILITY FROM A FIELD PERSPECTIVE

Chris Clarke

Following the 34-day conflict between Israel and Hezbollah in the summer of 2006, South Lebanon remains littered with a huge and unprecedented number of unexploded submunitions. In the absence of any direct and usable information from Israeli official sources, information garnered from Israeli media reports place the amount fired into South Lebanon at some four million, which even with a conservative estimate of the average failure rate puts close to one million unexploded individual submunitions on the ground.

In partnership with the Lebanese Armed Forces (LAF), the United Nations Mine Action Service (UNMAS) manages the Mine Action Co-ordination Centre South Lebanon (MACC SL) and is currently coordinating over 1200 personnel, from nine different international organizations, directly involved in clearance of these unexploded submunitions. Survey and reconnaissance on the ground so far establishes that over 35 million square metres of land is contaminated. In addition to causing civilian injury and death, this is effectively denying access to approximately 26% of usable arable land. As at 13 April 2007, 144,049 individual submunitions have been located and destroyed.

In South Lebanon, all three means of delivery have been used (Air dropped, artillery fired, rocket delivered). Old BLU63 submunitions dropped from CBU58 containers, so far account for around 21% of the overall figure found on the ground and clear evidence has been found that the high failure rate of this type of cluster weapon may be due to it being “passed its shelf life”. Most CBU58 container shells found have a loading date of 1970 through to 1973 and at least one example of a warranty plate has been found stating “warranty terminates 6/73”. Many of this type have had a complete failure with entire containers impacting without deploying their individual bomblets.

Unexploded M42 and M46 submunition grenades, delivered by 155mm artillery (M483A1/88 per shell) have been found across the entire area and so far account for 36% of the overall figure. In many cases, individual submunitions have armed themselves correctly but failed to detonate on impact even when the impact surface is concrete or hard rocky ground. These pose a great threat to both clearance personnel and civilians alike due to the uncertain condition of the stab (or friction) sensitive detonator and the striker.

Unexploded M77 submunition grenades, delivered by M26 MLRS rocket system (644 per rocket) have also been found in extensive quantities and so far account for a further 36% of the overall figure. These also have proven to have a higher than average or expected failure rate and, together with the M42/46, pose the greatest danger and have caused the highest number of post-conflict civilian casualties.

The 155mm artillery delivered M85 (M395/63 per shell and M396/49 per shell) has also been used and so far accounts for 6% of the overall figure. Both M85 with self-destruct mechanism and without have been used. Whilst several military users maintain that the M85 with self-destruct mechanism has a failure rate of less than 1%, the evidence on the ground in South Lebanon clearly shows that this weapon has a reality failure rate of between 5 and 10%. It is common to find at least 3 unexploded submunition grenades from individual carrier shells (M396/49 per shell) equating to a 6% failure rate, whilst the M85 without self-destruct mechanism is commonly found with a 15% failure rate on the ground (M395/63 per shell). Regardless of the actual failure rate figure for this weapon, it is most definitely higher than the less than 1% figure doggedly quoted by military users and manufacturer/designers.

Whereas, a 1% failure rate may often be achieved in controlled tests, the exigencies of combat operations and the vagrancies of storage and transportation on the battlefield combine to make the actual failure rate different, and most certainly higher. Consistent refusal to recognize and accept that unexploded submunitions are always (Kuwait/Iraq 1991, Kosovo/Serbia 1999, Afghanistan 1999/2000 and Iraq 2003) found in significantly higher quantities on the ground after combat usage than the amounts theoretically indicated by routine service testing precludes any balanced discussion on the military utility of these weapons versus post-conflict humanitarian impact.

The M42, M46, M85 and M77 have a drag ribbon, which, when fired, unfurls to stabilize and arm the bomblet. The presence of this drag ribbon has an additional side effect of causing the bomblet to become entangled in trees and bushes and to hang there presenting an additional hazard to farmers and specialist clearance personnel.

During the actual conflict in Lebanon approximately 1000 to 1200 Lebanese civilians were injured or killed as direct result of the intensive bombing. Since “peace” has come, some 200 civilians have been injured or killed by unexploded submunitions. In addition, thousands more are denied access to their land and the ability to return to normalcy. This is the real measurement of the post-conflict impact of the use of cluster munitions**.** Additionally, the international community is currently paying approximately US$40 million to fund the post-conflict clearance of unexploded submunitions in South Lebanon. Since the ceasefire (14 August 2006), 29 specialist clearance personnel have been injured whilst locating and clearing these weapons, of which 8 subsequently died of their injuries.

Many of the actual areas targeted by these weapons are thickly vegetated with natural bushes and trees, including citrus trees, banana plants and olive groves. On many clearance sites it is obvious that this thick vegetation cover has had the effect of slowing down the rate of descent of the submunitions and therefore had an effect on the velocity of final impact. This in turn precluded the striker contacting the detonator with enough force to cause detonation. In such cases the striker may actually be in contact with the stab sensitive/friction activated detonator and any slight movement may cause the unexploded submunition to detonate.

There is no common cause for the high failure rate of this weapon. Unexploded items have been found properly deployed and properly armed, properly deployed but not fully armed and not properly deployed. There is a design trend common to all those unexploded submunitions that repeatedly fail to function as intended and continually cause a significant post conflict hazard that results in high levels of casualties for civilians and specialist clearance personnel (both civilian and military), as well as creating a lasting impediment to post conflict rehabilitation and reconstruction.

Clearly the use of a weapon system manufactured and loaded in the early 1970’s but actually used in combat over 30 years later, well past its stated warranty period, can be expected to yield a high failure rate. (BLU 63 and similar).

The M42/46, M77 and M85 are all characterized by being mechanically armed, impact detonated and incorporating a stab or friction sensitive detonator. The use of M42/46 and M77 types have routinely created an extensive and complicated post conflict ERW problem. Their use in South Lebanon in 2006 and the resulting high numbers remaining unexploded on the ground are another clear example of this.

DISCUSSION

Most participants agreed that the issues raised by Mr. Clark were serious and needed to be carefully considered. A number were surprised by the fact that significant numbers of the unexploded submunitions were models with the self-destruct features, which, in addition to the primary fuze, also failed to function. One participant commented that the information provided thus far had strengthened his conviction that technology was not the right approach to solving the cluster munitions problem, and that the only acceptable route was a total prohibition of the weapons.

The questions inspired by Mr. Clark's presentation generally focussed on the M85 submunition. Participants asked for further statistics on the number of M85 submunitions used and cleared which had self-destruct features. Several participants also doubted the methodology used to determine the declared 6% failure rate for the self-destructing M85. It was felt that a count of munitions on the ground would not suffice to arrive at such an estimate, and that there was a danger that the figure might be inaccurate. The point was also made that the 6% failure rate provided for the M85 with self-destruct features was lower than that of other submunitions used in the conflict. It was asked whether Mr. Clark considered self-destruction as a part of the solution to the problems caused by cluster munitions.

Mr. Clark responded that he did not have complete figures on the number of M85 submunitions used during the conflict. Nor did he have a breakdown of the total number of M85 submunitions with and without self-destruct features. The Mine Action Centre had not registered such details in all the areas in which it was carrying out its activities. Mr. Clark also explained that the calculations concerning the M85 would change, as the figures provided were only based on what had been found thus far. While they have found fewer M85s than other types of submunitions, this was probably due to the fact that fewer of them had been used. However, he expected that the failure rate of the weapon was likely to increase rather than decrease as work continued.

However, the specific submunitions features were recorded while the particular strike site referred to in his presentation was being cleared. In addition to the number of unexploded submunitions, packaging, carrier shells, other materials found at the site, and a count of the detonation holes helped establish the type and total number of submunitions delivered. In Mr. Clark's view, all these facts provided enough evidence upon which to base an estimated 6% failure rate for the M85 used in that particular strike. Nevertheless, he stressed that the point is not that the estimated failure rate is 6%, 10% or another figure, but that it is greater than 1%.

On whether self-destruct technology is the solution to the problem of unexploded submunitions, Mr. Clark agreed that submunitions with self-destruct features are preferable to those without. However, he did not consider these to be an adequate solution, due to the fact that the failure rate of self-destruct mechanisms is rather significant and that the technology is not close to being 100% reliable. He stressed that in the discussions and development of relevant technology, there needs to be greater consideration of the reality of using these weapons in battlefield conditions. Mr. Clark added that this story was not new. In Kosovo, experts regularly told him that the failure rate of the BLU-97 and BLU-755 was 2 to 4%. Yet, the evidence on the ground showed that the rate was significantly higher, thus highlighting that the technology often promoted as the solution to the cluster munitions problem has consistently been less reliable than claimed.

The suggestion that a 6% failure rate was lower and thus more acceptable than the estimated failure rates of other submunitions provoked reactions from several participants. It was pointed out that reducing the failure rate of submunitions to 6% would not be a credible solution because of the large numbers of submunitions which are often delivered. Even with a failure rate of 6%, the numbers of unexploded submunitions would remain considerable when hundreds or thousands of munitions are delivered in a single volley.

Unlike many other countries affected by cluster munitions and other ERW, mine risk education (MRE) was already being conducted in South Lebanon before the recent conflict. Several participants noted that Lebanon had significant casualty figures despite the existence of established MRE programs. One participant who works in this field explained that MRE is often mistakenly viewed as a solution, but that this ignores the fact that even when they are aware of the dangers, people still interact with UXO. This is often due to economic reasons, and is evident in places where the problem is long-term, such as Laos. However, it also occurs where the war is of a shorter duration, such as Lebanon. The shape and colour of the weapons also attract children. The concluding point was that MRE needs to be combined with other preventive activities.

Finally, in response to several questions on clearance personnel casualties in Lebanon, Mr. Clark presented the latest figures in this area and explained that these statistics are kept separate from those on civilian casualties.

Speaker's Summary: RELIABILITY OF CARGO [CLUSTER] MUNITION TESTS Ove Dullum

The Norwegian Army conducted test of its stock of cargo ammunition at Hjerkinn Firing Range in Norway in September 2006. The cargo inventory consists of two types: the DM642 containing 63 bomblets of the type DM1383 and DM662, containing 49 bomblets of type DM1385. The latter is almost identical to the Israeli bomblet M85. Both kinds are fired from a 155mm howitzer. Both also have a pyrotechnic self destruct mechanism that is activated immediately after push-out from the container. DM642 and DM662 are the only types of cluster munition that the Norway currently have in stock.

The tests consisted of 144 rounds of DM642 and 192 rounds of DM662. All together more than 9000 bomblets of each type were dropped.

The test site is made especially for these kinds of weapons. It is a flat or slightly sloping field 400 x 600 m covered by sand and gravel. An advanced registration system, based on acoustical and optical means, is able to record the time and position of every bomblet impact detonation. It is also possible to separate bomblets that have gone off at impact from those that have been triggered by the self destruct mechanism.

The firings were made at different firing distances, varying from around 7 km up to around 22 km. The propulsion charges used were DM72 consisting of 3, 4 or 5 modules. This will result in muzzle velocities of 490 m/s, 630 m/s and 780 m/s respectively. The main reason for varying the velocities is that a high velocity results in a high spin rate. It was suspected that high spin rate could give a high load on the bomblets when they are pushed out of the container, resulting in an enhanced dud rate. The tests verified that assumption.

The results showed that on average 0.5% of the DM1383 remained as duds, while 1.1% of the DM1385 did so. This in turn resulted in a moratorium on the Norwegian use of such weapons.

The test also gave an opportunity to check the performance of the self destruct mechanism. However, as the primary impact function worked as intended in more than 99% of the cases, the number of tests of self-destruct mechanisms was limited. In addition, some of the duds were due to collisions between bomblets immediately after release from the container. This may result in detonations that may destroy neighboring bomblet so as to prevent its proper arming. Such bomblets will become duds irrespective of the performance of the self destruct mechanism.

To test whether a dud is properly armed or not, those duds that had indications of being armed were subject to a sensitivity test. The test consisted of firing a fuze cap close to the firing pin of the bomblet. This is the same as giving the firing pin a kick comparable to that which a person walking may inflict.

Against the duds of DM1383, not a single one reacted positively to this test, while for the DM1385, 9 duds gave a positive reaction. These numbers should be compared to the number of times the self destruct mechanism set off the bomblets. That event took place 24 times for the DM1383 and 26 times for DM1385. This implies that the self destruct mechanism functioned 24 out of 24 times on DM1383, while it functioned only 26 out of 35 times on DM1385.

Examining M85 bomblet sites in Lebanon, the picture seems to be somewhat different compared to the tests in Norway.

It should be emphasized that assessment of the dud rate at a site several months after a conflict, and where the public has had free access, poses some challenges. In addition, we are faced with the basic problem of not knowing how much ammunition was actually fired onto the site. However, some indicators may remain on the ground that can be applied to assess the number of rounds fired. These are:

- empty canisters;
- pusher plates;
- baseburn elements;
- packing materials;
- loose bomblet ribbons;
- impact craters;
- tactical assessment.

Combining all these indicators, it seems quite probable that the dud rate of the M85 bomblets used by Israeli forces in Lebanon is more than 5%, which is clearly in conflict with what we observe at the Norwegian tests. Another observation is that around 30-50% of the duds of M85s found in Lebanon seem to be armed, while 10% of the Norwegian DM1385 were armed.

We have no good explanations for these discrepancies, but age, storage conditions, production control, and firing mode seems to be the most obvious reasons. It should also be taken into account that tests done in peacetime and in controlled circumstances will always give better results than those in stressful and warlike situations.

DISCUSSION

The questions in this session focussed primarily on the testing of cluster munitions and the conditions under which Norway had conducted its 2006 tests. A prominent theme was the apparent rarity of testing under battlefield conditions. Some participants felt that the absence of testing in realistic conditions undermined testing as a reliable indicator on how submunitions would function when actually used.

In response to a question on why battlefield conditions are not more regularly simulated during testing, Mr Dullum explained that a variety of factors in battle could cause a weapon not to function as intended. These include the softness of the ground, uneven terrain, and other variables. However, the most influential factor is vegetation as it often destabilizes or removes the inertia of the submunition, which, as a result, does not strike the ground properly. He pointedly remarked that, if Norway were to regularly test in such an environment, it would have a big UXO problem. He also noted that, prior to the construction of the current Norwegian testing area, testing had been conducted in less controlled conditions. He provided one example of testing an American submunition on uneven terrain with vegetation. The corresponding failure rate was very high, and, in one case, exceeded 60 percent.

Another participant added that his country does not have a closed area in which to test its submunitions, and that it needed to go outside of the country to conduct tests. It had conducted tests in areas of vegetation by dropping submunitions out of a helicopter. These submunitions had been altered so as to contain no explosives. Although these tests showed a higher failure rate than when dropped on hard surfaces, they did not reach the levels seen in Lebanon.

The absence of battlefield conditions in testing was viewed as a very striking and important point. One participant wondered whether any lessons could be drawn from the testing of automobiles. The automotive industry is required to test vehicles in a wide variety of situations for safety reasons. Similarly, an extensive testing regime could be required for cluster munitions before any system is allowed to be used in the field.

It was also noted that human error is a factor that can influence the functioning of munitions and lead to higher rates of UXO. Human error often increases in stressful war-time situations.

Answering a question about the impact of wind on the Norwegian tests and on the failure rate more generally, Mr Dullum clarified that the 2006 Norwegian tests had been suspended for one day due to winds over 20 knots. This was not due to the effect of the wind on the submunitions, but was rather because the noise from the wind hampered the acoustic monitoring of the explosions. He further indicated that wind would generally have little or no effect on the dud rate of munitions, although it could contribute to inaccuracy.

A participant pointed out that most tests focus on the primary fuze, and that there is currently very little testing of the reliability of self-destruct devices. This is potentially very significant since self-destruction has often been hailed as the solution to the cluster munitions problem. In the Norwegian tests, only 35 self-destruct devices were tested out of some 9400 submunitions dropped. Of this small number tested, one in four self-destruct devices failed to work as intended. The participant highlighted that it was unfortunate that politicians are often led to believe that this technology is the solution without taking into account the realities of testing or the realities in the field.

Mr. Dullum agreed with this point and confirmed that the Norwegian tests had focused only on the primary fuze. He added that earlier reliability tests on self-destruct devices specifically had shown these mechanisms to have a 70% to 80% reliability.

Speaker's Summary:
ACHIEVING HIGHER ACCURACY
Franz Jüptner

Significant technological advances in electronic munition and propulsion systems have made it possible to develop carrier systems such as rockets or artillery shells with operational ranges 60 km and more. Airborne carriers can go beyond that. However, if the artillery systems are unguided, the various errors from launch to impact along the trajectory require measures to ensure higher target effectiveness and to avoid injury to non-combatants as well as collateral damage. In order to ensure this capability, "accuracy" of cluster munitions is a mandatory requirement.

"Accurate" cluster munitions or submunitions are munitions, which are effective only within a pre-defined target area. "Inaccurate" cluster munitions or submunitions are munitions, which are also effective outside a pre-defined target area.

The performance of weapon systems containing cluster munitions is typically determined by the following factors:

1. Target reconnaissance,
2. Weapon design,
3. Warhead and dispenser design, and
4. Submunition design.

The corresponding functional requirements are related to technical requirements and defined by their technical parameters.

System Performance is proven on the basis of simulation and test results; for cluster munitions this can be done with respect to the performance and accuracy of target acquisition, of dispenser and ejection systems, and of cluster munitions. In this functional chain the first three factors offer cost effective technical solutions for improving accuracy, e.g. guidance and control units etc., whereas cluster munitions, due to their previous "design to cost approach", are more or less dependant after ejection on ballistic properties in their secondary ballistic phase.

For unguided artillery weapon systems the calculated trajectory of the rocket or shell is perturbed by a lot of influences such as cross winds, variations in propellant temperature and weight, aerodynamic instabilities, etc. These lead to deviations between the centre point of the bomblet impact pattern, the "Centre of Gravity" (CEG) and the original aim point. Statistical methods are generally used to describe the spreading of bomblets on the ground in terms of "1, 2, or 3 • (sigma) dispersion"; the distance between CEG and aim point delineates the numerical value of the so-called "bias". Failures that contribute to inaccuracy are target location errors (caused by inaccurate reconnaissance), weapon system malfunctions (e.g. by launcher or munitions) and inaccurate meteorological data. Aerodynamic stability of the dispenser system and forces acting at the moment of ejection will also significantly influence the so-called secondary ballistics on the remaining trajectory on the submunition.

Substantial progress in the development of munition electronics has made it possible to integrate features into weapon and munition systems which nowadays allow significant improvement of system performance by means of course correction of artillery munitions, target location and target scenario recognition.

Emphasis should be put on a balanced performance of reconnaissance, weapon and munitions design to reach the best possible overall system performance!

Design concepts to achieve these goals incorporate sensors and actuators for course correction, e.g. satellite navigation, inertial navigation or ground radar tracking. Actuators can be installed as aerodynamic elements e.g. canards, hot gas systems or micro reaction thrusters.

Research and technology as well as development efforts have shown that for guided artillery rockets a bias of less than 15 metres independent of range can be reached using satellite navigation; by inertial navigation, a bias of approximate 1 mil[27] or better can be accomplished, dependent on inertial measurement and sensor equipment.

The performance of tube artillery shells can be improved in the same way: “Air Brakes” as an aerodynamic element allow for 1-dimensional down range course correction, enhancing down range dispersion to less than 15 metres by using satellite navigation. Two-dimensional course correction can be realized using canards as aerodynamic trajectory control elements.

Recent technical progress allows us to conclude that achieving higher accuracy is technically possible. From the very beginning of defining the military requirements, proof of design principles, through verification and final batch acceptance testing, emphasis should be put on high performance of target reconnaissance and balanced specifications of all subsystems!

The development and production of cluster munitions according to the military requirements and, in the sense of the above-defined accuracy “to become effective only in a predefined target area”, seems to be feasible.

DISCUSSION

Several speakers noted that the technology discussed in the presentation focussed on the cluster munitions canister and not on the individual submunitions. It was pointed out that submunitions, and not their canister, are the main source of the humanitarian problems associated with these weapons. One participant asked whether any work is being done to improve or direct the flight of individual submunitions. Another commented that he thought sensor fuzing may be part of the solution, but that more rigorous testing is needed. He also questioned whether the airbrake mechanism referred to in the presentation would have the desired impact. He noted that such a mechanism is similar to the parachutes, ribbons and other wind correction devices already found in cluster munitions, and that it may be one more thing which will go wrong in a weapon system that has a long history of things going wrong with it.

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[27] Deviation of 1 metre side ways at a distance of 1 thousand metres.

Mr. Juptner responded that there is some ongoing work to make specific submunitions more accurate, mainly in the work done in relation to the BAT systems. However, he added that aerodynamic corrections are difficult to integrate into small submunitions such as the M77. Concerning the reliability of air brakes, he indicated that a number of countries have designed and tested such mechanisms and achieved reliability rates of more than 90%.

Mr. Dullum added that there is a need to differentiate between tube artillery and rocket artillery. Rockets have a greater bias that may reach as 300-400 metres at 25 kilometres. Therefore, rocket artillery is of little value if they are unguided. Mr. Dullum explained that boost wind was one of the most significant factors affecting accuracy because it is so unpredictable.

Speaker's Summary:
FEASIBILITY OF INCREASING THE RELIABILITY AND ACCURACY OF CLUSTER MUNITIONS
Sun Tao

The humanitarian concerns of cluster munitions are mainly caused by unexploded submunitions. It is impossible and unscientific to completely get rid of all unexploded submunitions or dud submunitions.

The purpose of improving reliability and accuracy of cluster munitions is to reduce the number of unexploded submunitions and control the impact area of such munitions, so as to facilitate favourable conditions for post-conflict efforts to clear relevant explosive remnants of war (ERWs).

I. Reliability of cluster munitions

In practice, many accidental factors during design, manufacturing, storage or using phases of cluster munitions might lead to the failure of detonation and occurrence of dud submunitions.

Some technical measures can be taken in accordance with those factors leading to the failure of detonation, so as to improve the reliability of cluster munitions, reduce the possibility of unexploded submunitions and to ensure unexploded ones in safe conditions for clearance. Such measures involve different phases of the life cycle of cluster munitions. Only through comprehensive measures, can the function reliability of cluster munitions be effectively improved.

Due to different manufacturing capabilities, storage conditions, operation procedures as well as such other accidental factors, high reliability rates during design, research, development and even manufacturing phases do not necessarily convert themselves into low dud rates in actual operations. Therefore, the establishment of mandatory reliability rate will not contribute much to the solution of reliability problem of cluster munitions in operations.

On the other hand, due to less developed technological, industrial and economic capabilities, it is unrealistic and inappropriate to oblige some developing countries to produce or use cluster munitions of too high reliability.

II. The necessity and feasibility of adding self-destruction mechanism

The effect of adding any type of self-destruction mechanism to improve the reliability of cluster munitions is quite limited, and sometimes might even compromise the overall reliability of such munitions. At the same time, under certain circumstances, it does not serve the interests of military operations. The necessity of adding such mechanism should be determined by specific needs and conditions. It is not appropriate to require that all cluster munitions be equipped with self-destruction mechanisms.

III. The accuracy of cluster munitions

Cluster munitions are area weapons. It is inappropriate to require the same accuracy for cluster munitions as for precision-guided munitions.

There are various ways to achieve higher accuracy for cluster munitions, especially for the dispensers of such munitions. During development and manufacturing of cluster munitions, using guidance technology, adding guiding mechanism to ordinary cluster munitions and trajectory adjustments can be adopted. These measures are not appropriate for all circumstances and for all types of cluster munitions.

In addition, there are still many technical ways to improve the accuracy of cluster munitions in the use stage. Comparatively speaking, measures taken at the use stage to improve accuracy are more practical, feasible and more effective. These should be the direction of our efforts in this regard.

IV. Conclusions

Improving reliability and accuracy of cluster munitions might help reduce humanitarian concerns caused by unexploded submunitions, but the effect is limited. In this regard, countries can take practical and feasible technical measures, in accordance with their own national conditions and military needs, to improve the reliability and accuracy of cluster munitions to the maximum extent possible so as to minimize the threats from unexploded submunitions. However, due to different military doctrines and the technological, industrial and economic capabilities of different countries, technical support for the establishment of universal and mandatory criteria and measures in this regard is lacking. Such criteria and measures will not receive common support and universal implementation.

In fact, technical measures to improve reliability and accuracy are not the only way to solve the problem of cluster munitions. It is more important to promote the universal and earnest implementation of existing principles of international humanitarian law and the ERW Protocol.

DISCUSSION

(presenter spoke with interpretation).

Several participants sought to explore the 1% failure rate mentioned in the presentation. They asked whether China is pursuing such a policy, and, if so, through which kind of technology. It was also asked whether this figure applied to future production or current stocks of cluster munitions. One participant noted that China had accepted technology improvements to landmines under amended Protocol II to the CCW. Another expert observed that it appeared from the presentation that China did not rule out the need for reliability improvements, but that its objection was related to the cost burden for developing nations.

In reply, Mr. Sun Tao explained that it should be a common objective for all countries to improve the reliability and accuracy of cluster munitions in order to address the humanitarian concerns. But, in so doing, technical and financial capabilities also need to be taken into account. He indicated that China had not achieved a 1% failure rate for its munitions, but that it was moving to improve their reliability. He noted that a 1% failure rate was an example taken from other countries, and not a specific Chinese standard. China was still mostly at the stage of mechanical fuzes, but moving towards electronic systems.

Mr. Sun Tao highlighted that 1% is often the failure rate referred to at the design stage of the weapon, but that the actual rate in the field is generally much higher. In his view, the difficulties in this area are one reason why the failure rate is not the most important factor in reducing the number of unexploded submunitions. He felt that international requirements in this area are not necessary. Concerning the reference to amended Protocol II, Mr. Sun Tao explained that mines are different from cluster munitions in that they are defensive weapons, whereas cluster munitions are used for their immediate effect. He added that because submunitions are quite small, requiring self-destruct features might increase their size, cause unreliability, and diminish their effectiveness. He also pointed out that the area effect itself could be of militarily value.

In response to this point, one participant expressed his view that improving technology in areas such as target recognition, guidance systems, and specific targeting capability would allow more precise target engagement and thus reduce the number of rounds required. This would reduce the overall number of duds on the ground.

Mr. Sun Tao's was asked whether his views against the adoption of reliability criteria are due primarily to the expected financial burden for certain countries and, if so, whether technology exchange would be a useful way to help address this problem.

Mr. Sun Tao replied that it is difficult for a developing country to have the advanced technology needed to equip weapons with self-destruct mechanism, targeting mechanisms, and other technologies that might improve reliability and accuracy. Technology exchange would be a welcome way to overcome this.

A number of experts agreed that technological improvements in this area are complex and costly and that these costs should not be borne by developing countries. They did not, however, share Mr. Sun Tao's analysis that the solution to the problem is primarily better implementation of existing IHL. At least one participant felt that this approach relis too much on the status quo, that it reflected "a do nothing approach" in the face of a serious humanitarian problem, and that a ban on the weapons is a better solution. Another participant agreed, adding that developing countries should not be obliged to use funds to improve cluster munitions, but that the best solution was for them to never come to be affected.

Mr. Sun Tao replied that he does not view the strict application of existing IHL and the Protocol on Explosive Remnants of War as a "do nothing" approach, but rather as an active approach. By strictly implementing IHL and by seeking to improve reliability and accuracy for both military and humanitarian reasons, China is taking action on this issue. He stressed that both the military value of the weapon and its humanitarian consequences need to be considered, and that there may be different judgements on whether cluster munitions should be eliminated.

A participant from a developing country confirmed that it is difficult for countries such as his to have sufficient resources for advanced technology. Their priorities are generally food, health, and the generation of employment. Yet, these countries also need to be prepared to defend themselves. This participant did not believe that advanced technology provides a global solution to the problem. The best solution is through better and more rigorous implementation of IHL.

SESSION IV - CLUSTER MUNITIONS AND INTERNATIONAL HUMANITARIAN LAW

Speaker's Summary
THE CASE FOR A NEW TREATY
Annette Bjørseth

Introduction

A lot has already been said on whether the existing IHL is adequate or not to deal with the humanitarian problems caused by the use of cluster munitions. My question is: adequate - to deal with what? Which problems and challenges do cluster munitions pose? Only on this basis can one discuss whether there are IHL obligations in place that may effectively address these problems.

I. The problems caused by cluster munitions

A humanitarian problem

First of all, we have a humanitarian problem, as has already been elaborated by other speakers, and as we have seen in all the different conflicts where cluster munitions have been used. The use of cluster munitions poses severe risks to civilian lives, both at the time of their use and for years post-conflict. The wide-area effect of most types of cluster munitions makes it very difficult – if at all possible – to distinguish between a given military target and the civilian population during an attack. As experience has shown, this causes large numbers of civilian casualties at the time of the attack. In addition, the large number of unexploded submunitions left on the ground after use cause civilian casualties even decades after hostilities have ended. Unexploded submunitions also have long-term impacts on civilian livelihoods; they hinder humanitarian assistance, the conduct of peace operations, post-conflict reconstruction and development efforts.

A military problem

In addition to this, our Generals tell us that these cluster munitions also pose a significant military problem. The reason is that the use of inaccurate or malfunctioning munitions in a military operation means having to spend more ammunition to achieve a given military aim. This implies reduced efficiency, increased costs, as well as increased risks to your own personnel, who may be forced to spend more time in an area before the military aim is achieved, thus making the unit more vulnerable to counter-attack. Causing large numbers of unexploded ordnance on the ground may also constitute a significant risk to your own personnel and reduce mobility if there is a need to move through the contaminated area at a later stage.

A “political” problem

There is also what may perhaps be called a “political” problem. Many have now realised that the use of weapons that cause enormous humanitarian problems both during and after the conflict – such as cluster munitions – may in fact undermine the overall (political) aim of a given military operation. In most modern-day military operations, the use of military force is but one component of an overall political strategy – which usually is to promote stability and security, and ultimately peace and reconciliation. As I’ve already mentioned, experience shows that the majority of victims from the use of cluster munitions are civilians. The presence of unexploded cluster munitions after use also reduces the effect of humanitarian assistance, post-conflict reconstruction and development efforts - and increases the poverty of the civilian population by destroying their livelihoods. In addition to the “CNN-effect”, this may easily create hostility and new tensions among the affected civilian population, and may in fact directly undermine the long-term political goals that the military action was supposed to foster. So – what may seem to be effective to achieve a short-term military advantage, may in fact prove to be counter-effective to the overall aim of the military operation.

Further proliferation and a looming humanitarian disaster

Yet another concern is the looming humanitarian catastrophe we will be facing if the existing stocks of cluster munitions are spread to other actors, be they States or non-State actors. As of today, although cluster munitions have been used by States and a limited number of non-State armed groups in at least 23 countries, the scope of the problem is still fairly limited. However, over 70 States stockpile cluster munitions, which contain submunitions that number in the billions worldwide. If we fail to address the problem now, what is still a potentially controllable problem may easily turn into a disaster of global dimensions.

II. So what kind of IHL regulations are needed?

What can be drawn from this is that we need regulations in place that will:

1) prohibit the use of those cluster munitions that cause unacceptable humanitarian harm.

2) prevent further proliferation of the existing stocks of these types of munitions. This means that there needs to be a ban on the transfer of such munitions, as well as the destruction of existing stocks. Taking into account the costs and also environmental concerns related to the destruction of cluster munitions, a system for cooperation and assistance will be necessary for this as well.

3) ensure there are effective systems (for cooperation and assistance) in place to deal with the problems unexploded cluster munitions already pose on the ground – that is – clearance of contaminated areas, assistance to civilian victims and affected populations, re-development of affected areas etc.

III. To which extent does existing IHL address these problems?

Although there are no specific prohibitions in place today on the use of any types of cluster munitions, their use is not exempt from regulation under International Humanitarian Law. The general rules and principles of IHL – in particular as regards targeting and precautions in attack, do of course apply to cluster munitions, as they apply to all other weapons and means of warfare. These general rules and principles are codified *i.a.* in the 1977 Additional Protocol I to the Geneva Conventions. In addition, some post-conflict obligations will apply to those States which have ratified Protocol V to the CCW.

Problems related to the existing IHL:

One significant problem is that these obligations are of a general nature, they were not drafted with the specific problems caused by cluster munitions in mind. Discussions to date – as well as experience from military conflicts where cluster munitions have been used, make it clear that there is little agreement among States as to how these obligations are to be interpreted and implemented with regard to the use of cluster munitions. Although these rules, if properly implemented, would imply restrictions on the use of cluster munitions, they do not imply what is really needed, which is a general prohibition on the production, use, stockpiling and transfer of cluster munitions that cause unacceptable humanitarian harm.

In addition, there is a need to establish a comprehensive system for assistance to victims, clearance of unexploded ordnance etc. Although CCW protocol V does establish obligations on the clearance of ERW and other post-conflict measures, these obligations do not apply to the problems already caused (as it is not retro-active). Many affected States are also not party to the CCW.

IV. Summary

Summing up, we may conclude that although existing IHL does imply certain restrictions on the use of cluster munitions, these are clearly not adequate to deal with the serious problems related to this use.

There is a strong – and urgent – need for states to agree on an international, legally binding instrument that prohibits cluster munitions that cause unacceptable humanitarian harm, ensures their destruction and prohibits their transfer, and that establishes a comprehensive and effective system for cooperation and assistance with regard to clearance and victims' assistance.

I am encouraged to note that 46 states have already committed themselves to concluding such an instrument by 2008, and hope and trust that the number will grow significantly in the time to come.

Speaker's Summary:
TAKING ACCOUNT OF IHL PROTECTING CIVILIANS IN MILITARY OPERATIONS:
THE CASE OF CLUSTER MUNITIONS

Eric Steinmyller

Existing general rules of international humanitarian law (IHL) are globally adequate but suffer from an unwillingness to respect the rules, insufficient means to enforce them, etc. Nonetheless, there is room within IHL to deal with specific weapons through a ban or restrictions on the use of odious weapons violating essential principles of humanity.

The purpose of this intervention is to evaluate the possible efficiency of the general rules in combination with what may be a new instrument on cluster munitions.

First it is important to emphasise that existing IHL allows punishment of the misuse of cluster munitions.

The most important obligation of IHL, the *distinction* between the civilian population and combatants in order to spare the civilian population and civilian property, is linked to the principle of *proportionality.* The rule of proportionality establishes that an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated from the attack is prohibited.

There is no miraculous mathematic rule that can help in making an assessment of proportionality. The exceptional power to use force is directly linked with human responsibility. And this evaluation of the collateral damage caused by an attack can (*post-facto*) even be part of a criminal jurisdiction process. That is why the International Criminal Tribunal for the former Yugoslavia has made inquiries to evaluate, for example, the bombing by the Allies of the Serbian state television and radio building and the Grdelica Bridge – Where many civilians were killed. A new way has also been opened through the willingness of states to enforce existing law through the entry into force of the International Criminal Court (ICC). The Rome statute of the ICC qualifies the disregard of the principle of distinction as a war crime in its article 8a.

Pas analysis had to deal with "classical weapons" other than cluster munitions, such as depleted uranium. but no matter what type of weapon is used, the job of ensuring implementation of existing rules is the same as for the case of cluster munitions.

The evaluation of action in the field must take into account the fact that military commanders and other responsible for planning, deciding upon, or executing attacks have to reach decisions on the basis of their assessment of the information from all sources which is reasonably available to them at the relevant time.

Before dealing with misuse of a weapon, we should focus on two mains action which can be taken in advance to prevent excessive collateral damage. The first is the design of arms and the second is targeting.

First, as regards design, it is of the utmost importance for a State to have requirements that new weapons comply with existing legal regulations, be they general or specific. This means there is a need to proceed with a legal review before buying weapons "off the shelf" of designing new arms. For this purpose a robust process involving multidisciplinary teams must be in place involving the technician, the surgeon, the lawyer and the military.

Such a review process is not just good common sense, but is an obligation under Article 36 of Additional Protocol I of 1977. This obligation often suffers from a lack of implementation. In this regards I would underline the important work done by the International Committee of the Red Cross which in January 2006 issued a "*Guide to the legal review of new weapons, means and methods of warfare*", which aims to assist States in establishing or improving procedures to determine the legality of new weapons. It is precisely at the time of the legal review that questions of precision, reliability, the limitation of active life and of shelf life, stockpiling, marking, etc., should be addressed.

At the review stage, a new legally binding instrument could provide a more precise framework for judgements so we don't have to rely only on general rules or common sense. IHL has coped with many major issues at their source through the elaboration of new instruments, with the latest example being Protocol V on explosive remnants of war of the Convention on Certain Conventional Weapons.

As regards cluster munitions, tomorrow the threats will change and the appropriate answers may too. Can we exclude *ab initio* the possibility of technical progress and ban totally a method of delivering arms that increasingly takes into account protection of civilians, as long as it is implemented within a strict frame? Or, do we prefer to stick to our beloved unitary weapons with a devastating blast effect? For example some antirunway cluster munitions offer effectiveness in the destruction of the target and, at the same time, adequate precision to avoid incidental losses among civilians. The law of war aims to conciliate military needs and the requirements of humanity. It does not mean that it is one *versus* another.

The second main area of action to prevent collateral damage is in the field of targeting.

Firstly, the targeting process needs to determine what are legitimate targets in a strike list and must include a non-strike list of protected places. Each target needs to have an associated estimate of collateral damage.

The desired end state for nations deployed overseas in peacekeeping or peace enforcing operations is not the conquering of territories. In these operations avoiding collateral damages is a key aspect of the success of the mission.

In the theatre of operations, the military force must act with the *minimum fore* required. As a result, it is necessary to act on a precise function of the target and to neutralise its capacity for a precise time period.

The choice of the target is linked with the choice of the weapon. the targeting centre knows continuously the arms-readiness state of a plane or of artillery on the land. It takes into account the destruction pattern of a weapon with normally an oval form for a unitary weapon rather than with a round form. And so it will give a route of attack that will allow the attack to avoid or minimise collateral damage. It will determine if cluster munitions are or are not appropriate to the target, always bearing in mind the desired final end state.

If there is adequate room around the legitimate target, any type of munition can be used, still taking into account the nature of the landscape, for instance forest areas. The closer the target is to protected objects or people (and especially in urban areas), the more an accurate choice of munitions must be made, and the level of decision to strike or not will depend on higher authorities. This process is well integrated into operational procedures and is well known. After the attack, a battle assessment is done to determine the effects.

Conclusion

Clear rules exist in IHL and in military doctrine that provide a framework for the responsible use of cluster munitions. With the Oslo declaration, countries that consider these arms to have military utility have nonetheless expressed their willingness to move quickly towards a more precise framework for their design and/or use in the form of a new legally binding instrument.

Although France, which has participated in peace operation under a UN mandate with other countries all over the world, has not used cluster munitions since 1991, this does not mean that they are inappropriate munitions in all situations. Yet, France signed the Oslo declaration. Our commitment to peace is linked with the necessity to give appropriate means to our soldiers to achieve their mission.

DISCUSSION

Following the presentations, discussions focussed on whether the existing rules of IHL, including the new norms in the Protocol on Explosive Remnants of War, are adequate to address the humanitarian concerns posed by cluster munitions. Specifically, the question of how these rules apply to the use of cluster munitions in light of the weapon's special characteristics was posed from both the Chair and the floor. A central underlying issue was whether a consistent, integrated and urgent international response is possible without developing specific new norms for cluster munitions.

A number of participants asserted that there is a clear case for the development of new IHL rules, based on the effects that cluster munitions have had on the ground over the last 40 years. A UNMAS/UNDP survey was referred to, in which cluster munitions were identified as the greatest ERW threat to civilian populations and clearance operators. It was argued that if States have, as claimed, used these weapons in accordance with IHL and if there has been such a consistent pattern of humanitarian harm, then the existing law is inadequate.

One participant asserted that the debate is no longer about whether IHL is sufficient and new rules are needed. He pointed out that, by adhering to the Oslo Declaration, forty-seven countries have already acknowledged that new rules are required. He further emphasized that the problems caused by cluster munitions are not only a question of inappropriate use or misuse, but also a result of the nature and inherent characteristics of the weapon, more specifically their indiscriminate, wide-area effects and the large number of duds usually left behind. It was also proposed that, at the very least, the use of cluster munitions in populated areas should be prohibited; as such use should be presumed to be indiscriminate and thus unlawful. Another participant commented that cluster munitions must, like other weapons, only be used against military objectives.

In response to these comments, Mr. Steinmyller said that a new instrument should address both the technical characteristics and the use of cluster munitions. Ms. Bjørseth emphasized that regardless of whether the use of cluster munitions violated existing rules of IHL, the humanitarian effects have been devastating. As a result, it was argued, there is a strong case to be made in favour of new regulation, which should also cover stockpile destruction, victim assistance, and other matters not covered by existing rules.

In response to a question on how to define cluster munitions that cause unacceptable harm to civilians, Ms. Bjørseth stressed that the humanitarian effects should be the starting point for any definition, and that an approach that is too technical would quickly be outdated. Based on this, a definition of cluster munitions would, as a minimum, need to cover the indiscriminate effects of the weapon and the UXO problem. Ms. Bjørseth also emphasized that definitions would be a central element in future negotiations and decided by States.

Several participants questioned the need for new rules. One argued that armed conflicts will always have humanitarian consequences and that, while this is regrettable, this does not necessarily imply that the existing law is inadequate. Before assuming that new rules are needed, it is necessary to consider whether existing rules are being applied appropriately. If parties to a conflict are not following existing regulations, why would they be expected to adhere to and respect new rules? The focus, it was emphasized, should be to encourage countries to adhere to, and better implement, existing IHL. In response, Ms. Bjørseth said that because cluster munitions are weapons which lend themselves to be used indiscriminately, it is necessary to prohibit, remove and destroy the weapons, and ensure that they are not transferred.

Another participant suggested that the ERW problem caused by cluster munitions could be dealt with through technical measures to reduce the failure rate, and that their wide-area effects could be dealt with through strict implementation of IHL. However, he also acknowledged that there may be room to articulate specific IHL rules, taking the characteristics of cluster munitions into consideration.

What was unclear to at least one participant was how the general rules of IHL are actually being operationalized in light of the characteristics of cluster munitions. While many governments take their IHL obligations seriously, how IHL is implemented with regard to these weapons is often unknown. Another participant indicated that such information has been provided by his country in the context of the CCW. He also referred to a paper that outlined the elements that a commander can be expected to know and factor in during proportionality assessments. He added that a defending State also has obligations under IHL, which an attacking military commander must be able to assume are being implemented when assessing the proportionality of an impending attack. Examples of defending States obligations include the responsibility to warn and evacuate civilians and to demine contaminated areas.

Ms. Bjørseth commented that, in her view, it would generally be difficult to use most cluster munitions currently in stocks in a lawful manner because their use would conflict with the rules of distinction and proportionality. Mr. Steinmyller added that special instructions could be issued to commanding officers on the use of particular weapons, such as cluster munitions, in certain areas. It was also crucial to equip troops with appropriate ammunition.

Another key theme in the discussion was the extent to which the foreseeable and longterm effects of cluster munitions need to be included when assessing the proportionality of an attack. One participant stressed that a military commander could only be expected to consider the information he has at the time of the attack. It may, for example, be perfectly lawful to use cluster munitions in a de-populated area since the events which might unfold after the attack are uncertain, remote and unpredictable.

In response to this comment, Ms. Bjørseth observed that it is difficult to claim that the long-term effects of cluster munitions are too remote or uncertain to be considered by a military commander. Experiences in Vietnam, Laos, and other places have demonstrated both the magnitude of the problem and the length of time required to resolve it. The Chair added that States Parties to the CCW noted at the November 2006 Review Conference that the foreseeable effects of ERW (including cluster munitions) on the civilian population are a factor to be taken into account in making proportionality judgments. Mr. Steinmyller also pointed out that commanders will often be concerned about long-term effects, such as an ERW problem, will often be contrary to the "desired end" that they may be trying to achieve.

Another participant expressed concern about a military commander's ability to take into account the foreseeable effects of cluster munitions if reliable information is not available. For instance, there are discrepancies between the failure rates declared in production and testing and those which actually occur on the battlefield. Considering these difficulties, the same participant argued that it would seem prudent to apply the precautionary principle and not use cluster munitions at all. It was also stressed that the effects of cluster munitions in populated areas are clearly foreseeable, and a prohibition on the targeting of military objectives located in such areas had been proposed. The point was also made that the divergence of views on the factors to be taken into account in proportionality assessments showed that the general rules are applied differently, and that there is a limit to what can be achieved through better implementation when rules are vague and interpretation differs. There is therefore a need for further clarification through new norms.

Several comments focussed on the Protocol on Explosive Remnants of War. One participant asserted that, despite certain weaknesses, the Protocol could be useful in addressing the problems caused by cluster munitions. However, in his view, it would be better if the Protocol were not used very often. This could be one possible effect of good rules on cluster munitions.

One expert asked whether the implicit recognition in the Protocol that all munitions generate a certain percentage of ERW suggests that this aspect of cluster munitions is not a relevant element in determining their lawfulness. In response, Mr. Steinmyller said that lawfulness could only be assessed by balancing humanitarian concerns with military utility, and by considering whether the weapon would cause excessive injury or effects. There is, as such, no direct link between the creation of ERW and the lawfulness of a weapon. He also stated that it would be a pity to "throw the baby out with the bath water" and that cluster munition technology could be improved in combination with a specific regulatory framework.

Concerns were expressed on the use of cluster munitions by non-State actors. One participant asked how new IHL rules would prevent use by and armament of terrorists, and how they would help in situations where one party is bound by obligations and strives to implement them, while the adversary has no obligations in this area. A reply was offered by another participant who noted that the law applicable to noninternational armed conflicts applies to non-State actors who can be held criminally liable for the unlawful use of cluster munitions. The fact that the law may be violated is not an argument against new rules.

Ms. Bjørseth added that she shared the concerns about non-State actors, and that a prohibition which covers transfers would help address this problem. Another participant referred to the Ottawa Convention, which has served to almost eliminate transfers of anti-personnel mines to non-State actors. The success of the non-governmental organization Geneva Call in getting certain armed groups to sign deeds of commitment not to use anti-personnel mines was also mentioned.

Speaker's Summary:
Cluster Munitions:
Overview of existing and proposed definitions
Vera Bohle

Introduction

The Geneva International Centre for Humanitarian Demining (GICHD) has researched currently available definitions and descriptions of the terms “Cluster Munitions” and “Submunitions”. The most relevant ones available in the English language are reflected in this paper. Following the compilation of definitions and descriptions, the GICHD conducted an analysis of the technical implications of the definitions. The full list of definitions and descriptions including references, as well as the full version of the presentation held during the ICRC seminar, is available through the ICRC.

Definitions / Descriptions and Their Technical Implications

The definitions and descriptions can be subdivided in three groups: (i) those with a broad approach, (ii) those presented in a regulatory context and (iii) those reflected in national legislation. The first group includes definitions and descriptions contained in NATO standards, International Mine Action Standards (IMAS), United Nations working papers, or UNIDIR, ICRC, CMC and HI studies; the second includes the proposals brought forward by Germany in the CCW – Convention on Certain Conventional Weapons – context and a description available on the website of the Norwegian Ministry of Foreign Affairs; the third includes the Belgian national legislation on Cluster Munitions.

In general terms, NATO, IMAS and the UN refer to Submunition as:

‘Any munition that, to perform its task, separates from a parent munition.’

This definition includes all kinds of launching and delivery methods (ground, air, sea) and all types of submunitions such as (i) those containing High Explosive (HE), (ii) those not containing HE, (iii) those containing nuclear, biological or chemical components, and (iv) landmines. Only the UN definition makes a limitation to conventional munitions and to submunitions that explode after dispersal or release from a parent munition.

In addition, the UN defined cluster munitions as

‘Containers designed to disperse or release multiple submunitions’
(CCW/GGE/X/WP.3)

This definition limits the term ‘cluster munitions’ to the container. The German definition below uses the term for the container including the submunitions.

Germany first presented a definition in the CCW in March 2006 (CCW/GGE/XIII/WG.1/WP.10). An updated version has been presented during the ICRC seminar, which reads as follows:

"Cluster munitions means an air-carried or ground-launched dispenser that contains submunitions with explosives. Each cluster munition is designed to eject submunitions over a pre-defined area target. Cluster munitions does not mean a dispenser that contains: (a) direct-fire submunitions, (b) flare and smoke ammunitions, (c) landmines, (d) submunitions that are inert post impact, or (e) less than ten submunitions with explosives.

"Submunition of cluster munitions means a munition, which contains explosives and separates from a parent munition. Submunitions are designed to detonate on, prior to, or immediately after impact on the identified target."

This definition excludes sea-launched Cluster Munitions, and in the HE section directfire submunitions, those that are inert post impact and those containing less than ten submunitions. The two latter, as well as target detecting submunitions, are defined as "alternative munitions":

"Alternative munitions means an air- or ground-launched dispenser that contains submunitions; the dispenser contains (a) submunitions that are inert post impact, or (b) less than ten submunitions with explosives. Alternative munitions are designed to eject submunitions over a pre-defined area target. They include multiple sensors with a capability to detect a target."

The German definition for Cluster Munitions and Submunitions would include all those types that have raised humanitarian concern so far (reference types used in Lebanon and other conflicts, or the "Dirty Dozen" identified by Human Rights Watch), but it might not include those types creating future concerns.

The Belgian law on Cluster Munitions of 9 June 2006, after a broad general definition of Submunitions, excludes those types only containing smoke-producing material, illuminating material, or material exclusively conceived to create electric or electronic counter-measures. A second phrase excludes submunitions with the ability to discriminate soft targets, but this can be considered theory because these systems are not developed yet. Interesting about the definition is the fact that technical aspects ("obligatory control of their trajectory and destination" or "can only explode at the moment of the impact") have been combined with humanitarian aspects ("indiscriminately saturate combat zones" or "cannot explode by the presence, proximity or contact of a person").

Conclusions

A clear technical definition including all aspects and allowing a workable subdivision of the terms "Cluster Munition" and "Submunition" has not been achieved yet.

The broad approaches are too broad to be useful in a regulatory context. They can be used as a base, but would require further specification. A technical definition will be required to specify which munitions will be addressed, but there are clear limitations to technical definitions: some parts of them may be political decisions (e.g. more or less than ten submunitions, direct fire, sensor fuze). Furthermore, it may be complicated to cover all munitions, e.g. submunitions released from a dispenser and not from a parent munition, new developments, or components such as White Phosphorous or Fuel Air Explosive, which are not High Explosive but still a humanitarian concern. There is however the possibility to combine technical and humanitarian approaches, as done in the definition for the Belgian law. The challenge will be to agree on a definition which covers all munitions having raised humanitarian concern, and those that may create problems in future. This will at some stage require political decisions.

DISCUSSION

In the discussions on this subject, a few participants questioned the value of discussing definitions at this point in the work, in light of the different views on the need for new rules. One participant asked whether it would not be better to agree on what States are trying to achieve before starting discussions on finer technical points. Other participants expressed contrary views, arguing that definitions are essential to arrive at a common understanding on what is to be controlled or banned.

Several participants emphasized the importance of including a precise definition of cluster munitions in any new treaty in order to avoid creative interpretations and loopholes. A specific concern was raised about the German definition, referred to in Ms. Bohle's presentation, which included an exception for *"submunitions that are inert post-impact"*. It was argued that this type of wording is open to varied interpretations, as it could, for example, be claimed that munitions with self-destruct mechanisms fulfil this criterion. Another participant posed further questions: To what does the exception for direct-fire submunitions specifically refer? Would the "less than 10 submunitions" criterion by itself achieve the result intended? What if these submunitions have a high failure rate?

In response, a previous speaker, Commander Frisch, clarified that direct-fire submunitions would be "line-of-sight" munitions and that the German definition uses cumulative benchmarks, so that the 10 submunition limit would be combined with the highest standards for accuracy and reliability.

It was also stressed by several participants that, before any exceptions are made for certain types of munitions, it needs to be clear that they will not pose any unacceptable harm to civilians. Sensor-fuzed weapons, it was observed, may be acceptable in theory, but their effects in practice also need to be considered.

Specific elements of a possible definition were suggested by a number of participants. Most proposals combined both technical and humanitarian aspects. One participant suggested that a definition should cover weapons containing large numbers of submunitions, with effects spread over wide areas, and which cause severe and lasting contamination to civilian populations. Another submitted that a definition should not set a specific failure rate or exclude submunitions with self-destruct features, and should include an IHL component, as was done in the Belgian law on cluster munitions.

One participant suggested that the work should aim at solving the problem on the ground by using, as the basis of a definition, the common characteristics of those submunitions causing civilian deaths and injuries. His experience in UXO clearance had shown that these weapons are typically high explosive; produced fragmentation effects, and are mechanically armed and impact-initiated with stab-sensitive or piezoelectric induced detonators. It was proposed that a list of cluster munition models proven to be unacceptable also form part of a definition.

There were several calls for the definition of a cluster munition to be simple. One participant proposed the “I recognize it when I see it” approach which would avoid painstaking negotiations over wording, as happened for example with the Chemical Weapons Convention. Another participant argued that the more a definition contained detail, the more it would exclude certain weapons or features. He also felt that it would be difficult to reach a consensus on a definition that is too detailed, and that a "differentiated product" which acknowledges that cluster munitions play different roles in different countries might be better. One participant, however, criticized these approaches and observed that a simple definition would not be feasible because certain States do not favour a total ban. Since the objective is to get rid of "bad" submunitions, and not a total ban, this will require a narrower definition with specific exclusions.

There were a variety of views expressed on whether the age of a cluster munition should be a factor in defining a prohibition. It was argued by some participants that most of the problems on the ground were caused by munitions designed in the 1960s and 1970s, such the BLU-63 series. It was stressed that a prohibition must cover these munitions. One participant thought that older submunitions may pose a problem because they have been more widely used, and that it should be investigated whether modern designs pose similar concerns. On these points, Ms. Bohle highlighted that older cluster munitions would in any case be covered by most of the technical definitions highlighted in her presentation. She cautioned against including age in the definition, and stressed the need for a definition that can anticipate future problems.

Another participant added that, in his view, age is not a good discriminating factor for determining the quality of cluster munitions. When surveillance testing of munitions is undertaken, some products do not survive their service life and will be destroyed, while others will exceed their service life and still will be reliable and safe. In light of this, any age requirement will need to be very carefully considered.

However, it was pointed out by a different participant that testing will only prove whether degradation is acceptable in terms of the initial design features, and that this could lead us in the wrong direction. A key question is whether one is satisfied with the old requirements or whether munitions should be improved with new features. It was later observed that a combination of age and stockpile surveillance requirements might be a possible solution.

SESSION V - THEMATIC SUMMARIES AND DISCUSSION

SUMMARY ON MILITARY ASPECTS AND POSSIBLE ALTERNATIVES
***Rapporteur*: Lt. Colonel Jim Burke**

The three opening presentations of the meeting, by Colin King, Simon Conway and Mark Hiznay, provided essential information on the history and characteristics of cluster munitions and on cluster munition stockpiles. These presentations clearly demonstrated the serious humanitarian damage, which has arisen from the use of cluster munitions over the past 60 years. They posed a challenge to users to demonstrate the military utility of these munitions and to demonstrate how it was proposed to fix the defects which have caused such humanitarian damage. In particular I would commend Mark Hiznay’s concise summary paper as a source of accurate statistical information.

It was somewhat depressing to note that the same problems identified in successive conflicts continue to cause excessive hardship to civilian populations. On a personal level I disposed of my first submunition a BLU 63 in Lebanon in 1985. That munition had been delivered in 1978 and my colleagues had been locating and disposing of unexploded submunitions for the previous seven years. I disposed of my last BLU 63 in Lebanon late in the year 2000, 22 years after it was delivered. Given this widespread and long-term ERW problem it is difficult to understand why the mistakes of 1978 and 1982 were repeated in the same small area of Lebanon, to a far greater order of magnitude, in 2006, 28 years later. There is an argument that this represents a failure not merely for the user and its suppliers, but for all of us in failing to take adequate action to prevent a recurrence.

Military utility

Therefore it was of crucial importance for this meeting to hear a military perspective on cluster munition use. It is true that much criticism of cluster munitions has ignored the problems faced by military commanders and has appealed to emotional responses to civilian injuries and hardships. If there is a case for prohibition or regulation or both, the military argument must be understood and deconstructed in a logical fashion. Otherwise we will have a classic dialogue of the deaf and civilian populations will continue to suffer.

Mark Hiznay informed us that 75 countries have stockpiled these munitions and 34 states have produced 210 different types of cluster munitions. Therefore one would think that there has to be a strong argument for their military utility. Yet this argument has not to date been made with any degree of success.

The presentation which opened the debate on military utility in session II reminded us that complex decisions and trade-offs are necessary in modern war. However if this trade-off involves sacrificing civilians in pursuit of a military objective it would be difficult for many at this meeting to accept. It was clear from the discussion that many would prefer that any trade-off would prioritise the saving of civilian lives by delaying mission accomplishment or even accepting own force military casualties.

Six common misconceptions regarding cluster munitions were postulated in the presentation. Remarkably however, every one of the suggested misconceptions was at least partially vindicated in the subsequent presentation, interventions and responses by speakers:
Cluster munitions, at least in their classic form, are **outdated** and derive from methods of warfare increasingly unlikely in the modern conflict spectrum**.**

- **Long term effects after use are not likely to be considered.**
- They **are indeed used as area attack weapons**.
- Their use has been frequently **indiscriminate and inaccurate.**
- Their use has presented a **major and complex ERW problem**.
- Finally **there are other alternatives** as demonstrated by the German presentation.

However the most compelling part of the presentation on military utility was the calculus of employment, which constrained cluster munition use. This begged the question of how could such weapons be considered legitimate if significant civilian casualties were being caused even after such an exhaustive target assessment process. Either we accept that such casualties are inevitable, given the competing principles of humanity and military necessity, and that the commanders were aware that cluster munition use could create such humanitarian damage **or** we accept that there is a need for clearer guidelines and regulations on how such weapon systems might be deployed, if at all.

The military roles proposed for cluster munitions were very broad and comprised tasks common to many weapon systems. This audience needed far greater clarity on the circumstances in which cluster munitions might confer a significant advantage over other available weapon systems.

A number of speakers recognised a need for a thorough analysis of military utility. In this context it should be recognised that other speakers stressed the importance of national defence which they felt had been ignored by many other participants and that too much emphasis was place on cluster munition use in foreign wars. A large proportion of available munitions in many states are now in cluster form and it would be costly and time consuming to replace them with alternatives. In the process leading to Amended Protocol II of the Convention on Certain Conventional Weapons and to the Ottawa Convention there was considerable discussion of military utility. A similar analysis is now required on the military utility of cluster munitions.

Possible alternatives and future developments

In session II we learned that the German Government has concluded after exhaustive research that the present generation of cluster munitions can be replaced by more humane alternatives and that this can be accomplished in a period of not more than 10 years. This was encouraging information. Germany agrees with many cluster munition users that there is a continuing military necessity to engage area targets. However, German experts feel they can achieve this capability with a dramatic reduction in the quantity of explosive munitions delivered to such a target, a consequent reduction in the ERW hazard and a reduction in the footprint of such weapons. There are two main components of this capability.

First, in line with other users Germany proposes the use of cargo munitions with a greatly reduced number of submunitions, less than 10, which will be sensor fuzed, thereby greatly increasing accuracy and greatly reducing the quantity of submunitions deployed.

The second element of the German proposal was more interesting and innovative and involved the delivery of non-explosive kinetic energy rods from cargo munitions to tightly defined target areas of approximately 60 square metres. Such rods would be of 83 mm in length and would be completely inert after use. Also, they would not be considered excessively injurious to humans and injuries, although often fatal, would be no more severe than those arising from 9mm ball ammunition. They would not leave an ERW footprint and, in Germany’s view, would be in compliance with Article 36 of Additional Protocol 1 of 1977.

While this is an encouraging beginning, a great deal of work remains to be done to convince both the military and humanitarian communities that these options represent a viable alternative while significantly reducing the adverse humanitarian impact.

Other matters

Throughout the session a certain confusion was apparent in the use of terminology. Terms including "smart munitions", "dangerous duds" and "unacceptable harm" seemed to be interpreted differently by different speakers. There would seem to be a need for all of us to use language with greater precision. Smart is a relative term to most people. If we mean sensor fuzed we should say sensor fuzed. If we mean selfdestruct we should say self destruct. Most of us will remember the old ICBL slogan ‘smart Mines are a dumb idea’. It is difficult to convince public opinion that any weapon, which kills civilians, is ‘smart’.

It is important to recognise, as many speakers have said, that improper use can occur of any weapon. However, it is also true that certain weapons lend themselves to indiscriminate use, which is why we have the CCW and other weapon-specific instruments such as the Anti-personnel Mine Ban Convention.

Conclusion

The evidence of humanitarian damage caused by cluster munitions is compelling. In the view of many colleagues at this meeting, there is an irrefutable argument that this category of weapon systems needs to be addressed in a specific regulatory manner either within the CCW or elsewhere. However this session also reinforced the view that if problems arising from cluster munition use are to be addressed successfully the military and technical realities cannot be ignored. While any such process must of course be directed and driven by a coherent political will, IHL instruments are of little value unless they are credible and capable of being implemented by military planners, commanders, weapons designers and procurement experts. Clarity is a vital component of any such instrument and clarity should not be confused with simplicity.

Any future instrument on Cluster Munitions should take into account the military and technical issues raised at this meeting in order to achieve such clarity. However, if this is to happen the military argument will need to be made in a more focused and proactive manner than was done here:

- in terms of clarifying accurately the real military utility,
- in terms of identifying the tactical circumstances where cluster munitions confer a real military advantage over other munitons,
- in terms of taking meaningful actions to address the humanitarian damage caused, and
- in terms of applying serious resources to the search for viable alternatives to cluster munitions.

International humanitarian law is based on the fundamental principles of humanity and military necessity. This balance is frequently presented as an adversarial conflict between two very different viewpoints and can be used as an excuse for inaction. The humanitarian lobby needs to listen to the military view and to try to understand the military uses of these weapons and the dilemmas faced by commanders in the field seeking speedy mission accomplishment while minimising own force casualties. This lobby should also accept that in dealing with weapons used in warfare there will not be an environmentally friendly, biodegradable solution to the problem of submunitions or indeed any other type of munitions. Nevertheless, in the aftermath of last summer’s Lebanon war, the onus has shifted decisively to the users and producers of these weapons to justify the legitimacy of their use, to demonstrate their military utility to the extent possible and to move quickly to address the serious humanitarian damage which is being caused.

COMMENTS OF PARTICIPANTS ON THE *RAPPORTEUR*'S ORAL SUMMARY

A military participant commented that the *rapporteur*'s synthesis gave a good overview of the issues discussed during the meeting. However, he reiterated his view that the military's concerns must be addressed in the debate on cluster munitions, and the right balance between military considerations and humanitarian aspects must be found. He recalled that several participant's interventions underlined that cluster munitions have a military utility and that every country would need to look at their specific needs with regard to cluster munitions. Another participant expressed strong agreement with this last point.

Concerning the six common myths outlined in the presentation on the ongoing military utility of cluster munitions, the same participant felt that many of these issues are not black and white and that discussion is useful to clarify and examine them in more detail. It was pointed out that many of these issues have been raised in other fora.

Another military participant generally endorsed the comments made by the *rapporteur*. He wanted to stress that, despite the changing nature of warfare with wars no longer being just about territory, the utility of cluster munitions has not changed, and they are still relevant in today's contexts. Cluster munitions will continue to provide military commanders with operational flexibility, responsiveness, and operational costeffectiveness in certain combat conditions. He stressed that, when comparing what unitary munitions and cluster munitions would achieve in an area of 600m x 600m, the choice could be made in favour of cluster munitions.

The same participant recognized that there were concerns about these weapons, but he questioned whether a ban would really solve the problems found on the ground today. He explained that every weapon has 'pre and post-conflict' issues and that these are covered by IHL rules. For example, the Protocol on Explosive Remnants of War, which has been ratified by his country, has the potential to address all post-conflict issues arising from unexploded submunitions. He was surprised that participants at this meeting had not focused more on what is currently available and on how greater adherence to these rules might be achieved. This would, in his view, address at least part of problem.

More broadly, the speaker thought that aspects of national security and geopolitics, such as alliances between countries, had to be taken into account. In addition, the technological and economical differences between countries also need to be considered. In his view, any solution had to work within this geopolitical, technological and economical framework. He went on to question whether precision munitions could be a solution in light of their costs, suggesting further work is needed in this area.

SUMMARY ON TECHNICAL APPROACHES

***Rapporteur*: Colin King**

I. PERFORMANCE AND RELIABILITY

General

There are many potential causes for the failure of cluster weapons and their submunitions. There was broad consensus that, while technology might help, it could never `solve the problem'.

Key elements of reliability include:

- Sound design, manufacturing standards and quality assurance processes;
- Good equipment husbandry (storage and maintenance);
- Proper employment, including decision-making, target reconnaissance, accurate delivery and the controlled release of submunitions.

Ageing

Designers and manufacturers agreed that the effects of ageing are unpredictable and that regular inspection was necessary to confirm the condition of stored weapons. Some components lasted beyond their expected life span, while others deteriorated far sooner than expected. The effects of ageing often proved to be a significant factor in the high failure rate of cluster munitions. With some recently-used munitions being more than 30 years old, it was hardly surprising that they suffered excessively high failure rates.

Electronic v. mechanical

Mechanical fuzes incorporate a number of components and generally involve a sequence of events in which failure might occur at any stage. Only a small percentage of components and assemblies can be inspected and tested and most are vulnerable to the effects of ageing. These include not only mechanical components (casings, springs, pins etc) but also explosive and pyrotechnic compositions, adhesives and lubricants. In contrast, every manufactured electronic circuit can be tested individually and, once assembled, there are fewer potential causes of failure. This means that well-designed electronics should be more reliable than the equivalent mechanical fuze. [*Rapporteur's* comment: this is borne out by the increasing use of electronic fuzes to replace mechanical versions in other ammunition.]

Redundancy

The duplication of fuzing components was suggested as an option to improve reliability. In principle, this makes good sense; however, the *rapporteur* commented that the BLU-97 submunition incorporates a back-up fuzing system that has not improved reliability, and has caused countless accidents through unpredictable functioning. Redundancy cannot, therefore, compensate for poor design.

Testing

It is widely accepted that testing produces optimistic indications of performance; this is because the broad range of operational conditions are not replicated in the tests, and other factors (such as stress-induced human error) come into play in combat. Designers pointed out that more comprehensive testing was possible, so long as the resources were made available. The *rapporteur* suggested that this was a case for industry regulation, and suggested the automotive industry as a possible model where a compulsory range of realistic tests have lead to major safety innovations and prevented the production and sale of vehicles with inherently unsafe designs.

II. SAFETY

It was agreed that Self-Destruct (SD), Self-Neutralisation (SN) and Self De-Activation (SDA) could all contribute to increased safety although, once again, they were not solutions *per se*.

Self-Destruct

For example, the Israeli M85 bomblet incorporates a well-designed SD system, which results in a significantly lower failure rate than similar non-SD types. However, Lebanon demonstrated that the failure rate is still unacceptably high, and that it is substantially higher than was achieved during testing. Pyrotechnics (often used in SD delays) apparently require great care in design, manufacture and storage to achieve high reliability.

Self-neutralisation

SN in electronic fuzes can be achieved by the isolation of the power source. `Reserve batteries', in which the cell is activated only when the weapon is deployed, can achieve this by discharging fully after a short period. However, the unknown status of an unexploded munition means that disposal teams must treat it as live, and it may still be hazardous to the local population under some circumstances, since the complete explosive train is still present.

Self de-activation

SDA entails the removal of part of the explosive train to irreversibly disarm the munition. A new US design apparently achieves this by destroying the primary explosive - the most sensitive and dangerous component. However, it was pointed out that under some circumstances, such as where unexploded munitions are salvaged for scrap and explosive, SDA was still an unsatisfactory solution.

"Non-hazardous duds"

The term "non-hazardous duds" was used repeatedly during the conference - mainly by designers and manufacturers attempting to draw a distinction between different categories of failure. Most felt that this term was potentially misleading and dangerous. It was pointed out, for example, that many so-called non-hazardous bomblets could become dangerous if mis-handled; this might occur under circumstances such as handling by a curious child, excavation or transportation.

III. TECHNOLOGY INNOVATION

"Smart" / sensor-fuzed munitions

The term "smart" is ill defined and should be avoided; in most cases it refers to sensorfuzed munitions, which is the name that should be used. It was considered completely misleading to refer to refer to bomblets with a self-destruct mechanism as "smart".

Availability

While sensor-fuzed weapons are likely to inflict less harm on civilians than mechanically fuzed bomblets, there was some concern that the technology and price involved would put them beyond the reach of developing countries. The replacement of old mechanical systems with sensor-fuzed munitions may be a logical step for advanced nations, but delegates should consider whether the technology goals and standards they set are realistic for poorer countries.

Alternatives

The German delegation proposed that sensor-fuzed munitions should be redefined as "alternatives" to distinguish them from other submunitions. This fits with their acquisition strategy for future systems, which would incorporate all available technology in order to maximise reliability and minimise humanitarian impact. One German proposal involves the use of kinetic energy to inflict damage rather than an explosive warhead (although the use of explosive charges to accelerate the rods was also mentioned). Further details are not available at this time.

IV. CONCLUSIONS

The overall view was that technology had a role to play in increasing reliability, and consequently reducing the harmful post-conflict impact of cluster munitions. However, it would be wrong to expect it to provide a full "solution" to the problem; technology could do little to reduce the effects from the types of cluster munitions that continue to cause unacceptable harm to civilians.

COMMENTS OF PARTICIPANTS ON THE *RAPPORTEUR*'S ORAL *SUMMARY*

Several participants commended the *rapporteur*'s report and his summary of the discussions. One participant stressed again that technology could contribute to solving the cluster munitions problem, but admitted that it would not be the entire or only solution. He very much appreciated the analogy made by the *rapporteur* on the testing of vehicles by the automobile industry. Automobiles cause deaths and injuries, but, thanks to technology (e.g. seat-belts and airbags), these risks have been lowered over time. Like cluster munitions, automobiles have a utility and, rather than being taken away from the road, they have been made more reliable. He felt that an improved understanding of the design and manufacturing of submunitions could contribute to reducing the problem on the ground.

It was pointed out by another participant that rigorous testing is not the only impetus for the automobile industry to improve its products. There is also the principle producer liability, an idea that should be seriously considered for cluster munitions.

In response, the *rapporteur* recalled that certain types of cars had been taken off the road because they were either unsafe or did not meet required technological standards. A very similar approach, he thought, should be taken for cluster munitions. In response to the report, several points were made on the differences between selfdeactivation and self-neutralization mechanisms. In response to an earlier comment, a participant explained that self-deactivation is a passive system whereby the battery life of a system comes 'irreversibly' to an end. Self-neutralization, on the other hand, is an active system through which a mechanism is triggered in order to 'neutralize' the fuze. However, this process could fail. It was thought by some participants that further work on these mechanisms might prove useful for efforts on cluster munitions. It was nevertheless highlighted by one participant that cost is an important factor in any technical work and that, if new technological requirements are to be considered for future cluster munitions, transfer of technology would also need to be taken into account.

One participant expanded on an idea that had been introduced the previous day concerning limits on the active life of cluster munitions. He proposed to introduce a maximum lifespan for cluster munitions whereby the weapons would be systematically withdrawn from service after they reached a certain age. This lifespan would be linked to the date upon which the weapon entered into operational service, and not to the date of its production or the conditions under which it was stored. It would apply to the shelf life of all cluster munitions, independent of whether these were considered "smart" or "dumb". Such a measure would also prevent the transfer of very old cluster munitions.

A participant highlighted that the Cluster Munitions Coalition is opposed to an approach which prohibits munitions based on a quality standard. It was argued that any future instrument identifying a specific dud rate as the basis for a prohibition would be difficult to implement and monitor in an effective way. It was felt that, whether or not this standard is achieved would be left to the "best intentions" of States, as has been the case for many past decades. Furthermore, technically improved cluster munitions would not really improve the current problem on the ground. A prohibition based on percentages, even a 1% failure rate, would still create large numbers of duds.

SUMMARY ON INTERNATIONAL HUMANITARIAN LAW
***Rapporteur*: Knut Doermann**

This summary highlights the main themes arising from the presentations and discussions in Session IV: Cluster munitions and International Humanitarian Law.

Adequate rules or a need for new law?

The presentations and discussion on IHL crystallized two views for dealing with the problems caused by cluster munitions.

One view was that the existing law on targeting contains adequate tools to deal adequately with the situation, as it already contains rules prohibiting direct attacks on civilians and civilian objects and prohibiting indiscriminate attacks, as well as obligations to take feasible precautions in and against the effects of attacks. In order to address the humanitarian consequences of cluster munitions, it was argued that there must be stricter application, implementation and enforcement of the existing law. With regard to enforcement, it was highlighted that international jurisdiction can have a role to play in controlling use which may be in violation of IHL.

Proponents of this view also emphasized that the Protocol on Explosive Remnants of War is an essential tool in minimizing the post-conflict problems caused by cluster munitions. This being said, many participants sharing this view recognized the humanitarian problems associated with these weapons and did not exclude an evolution of existing law.

The second view stressed the need for the development of new rules and emphasized that the existing law establishes only a basic framework to govern the use of cluster munitions. It was highlighted that the current rules of IHL are not sufficiently precise and, as a result, allow diverse interpretations of many key provisions. In addition, it was highlighted that the application of these rules does not sufficiently take into account the special features of cluster munitions. It was strongly argued that the current IHL framework needs to be supplemented and improved.

It was also observed that, even if existing rules were to be fully applied, the humanitarian impact of cluster munitions would remain significant and be an argument in favour of new rules. To some, the use of such weapons against military objectives in populated areas would necessarily cause excessive incidental losses to the civilian population. It was also pointed out that while the

Protocol on Explosive Remnants of War will, if strictly implemented, reduce the dangers posed by unexploded submunitions after the end of active hostilities, it will not prevent the consequences during or shortly following an attack using these weapons.

Although the discussions were often divided along the lines described, it was widely recognized by participants that the foreseeable effects of cluster munitions must be taken into account when determining the proportionality of the incidental civilian casualties or damage that may result from the use of these weapons. Many participants also recognized that the immediate and longer-term incidental effects of cluster munitions used against military targets in or in the vicinity of populated areas are generally foreseeable and are an integral part of assessing proportionality.

It is important to note that the development of specific rules to regulate weapons of particular concern is an integral part of IHL. This approach has been used in the past for certain weapons, *e.g.* chemical and biological weapons, incendiary weapons, landmines and booby traps. In each instance, the general rules of IHL provided a basic framework regulating the use of these weapons, but the international community perceived that specific rules were needed in response to the particular effects certain weapons could have on combatants or civilians.

On the basis of the presentations and discussions at this meeting, there are several issues which would benefit further explanation and analysis.

Firstly, is the use of cluster munitions against military objectives in populated areas to be reconcilable with the obligation not to use means or methods of warfare that cannot be directed against a specific military objective (see Art. 51 (4) (b) 1977 Additional Protocol I and similar customary international law)?

Secondly, how are the dangers to civilians (both during and after an attack), which arise from the use of cluster munitions, integrated into the proportionality equation? What kinds of factors are taken into account during military operations and how concretely are commanders able to implement the proportionality rule when deciding on the use of cluster munitions? As highlighted by some participants, the response to this question is often limited to generalities and does not focus on the operational elements. As a result, and in light of the persistent humanitarian problem posed by cluster munitions use, it is often difficult to analyze in any detail the argument that the existing general rules of IHL are adequate to respond to the humanitarian consequences of cluster munitions and that it is merely a problem of implementation and enforcement.

Thirdly, how can the largest number of users, producers and stockpilers of cluster munitions be engaged in the development of robust rules to address the problems associated with these weapons? Can the humanitarian objectives of other relevant treaties be maintained and strengthened through the development of new rules?

Fourthly, how can the potential for increased horizontal proliferation be addressed in the absence of specific rules? Cluster munitions have thus far been used by a limited number of States and non-State armed groups. However, given the fact that over 70 States stockpile cluster munitions, there is a strong probability that the weapons will proliferate, leading to increased use and higher risk for the civilian population.

Finally, it must be noted that the discussions in this session highlighted the need for a robust implementation of the obligation under Article 36 of the 1977 Additional Protocol I to the 1949 Geneva Conventions requiring that all weapons developed or acquired be subject to a legal review. The strict implementation of this requirement may help minimize the dangers to civilians that may arise from the efforts to improve the design of cluster munitions or the development of alternatives.

Definitions of cluster munitions

The importance of the issue of definitions was highlighted by the fact that it was raised many times throughout the meeting, but various approaches and their implications were discussed in more detail during this session. It is evident that agreement on definitions will be central in the efforts to develop new and more specific rules. An assessment of existing definitions indicated that different approaches have been chosen for different functions (*e.g.* military operations, ERW clearance, national moratoria on use; etc.) but they are not all intended or appropriate for international regulatory purposes.

While a number of participants did not see a need to attempt to develop a precise definition for cluster munitions at this stage, most who spoke felt that there is a value in identifying more precisely the kinds of munitions which could be covered by future regulations. In addition to clarifying which munitions are to be the object of scrutiny in ongoing work, there is also a benefit in knowing what is excluded.

Many specific definitional elements were proposed by participants. These included factors related to the age of the munition; the common features of the types found in affected countries; technical features related to self-destruction and accuracy; and elements of IHL. A range of views were exchanged on these and other areas.

However, the discussions on definitions were very much a review of what approaches exist and a testing of ideas. It would be premature to draw any final conclusions as the work in this area will continue and more detailed proposals are likely to evolve as discussions progress on a potential regulatory framework.

COMMENTS OF PARTICIPANTS ON THE *RAPPORTEUR*'S ORAL SUMMARY

Several participants commented that the *rapporteur*'s report was quite balanced in light of the range of views expressed at the meeting. One participant, however, thought that the oral summary had not quite captured the possible consequences for IHL if nothing is done with regard to cluster munitions. It was his view that the proliferation of cluster munitions would undermine IHL, as these weapons would be used by an increasing number of both States and non-State actors. The humanitarian impact of cluster munitions is likely to increase because certain regimes or non-State actors do not respect IHL, human rights law, or are not concerned about the security of their people. Another participant also recalled that the discussions over the last two days had indicated that any new IHL instrument should include aspects of assistance, compensation and sanctions and that it would be useful to include these in the report.

One participant thought that the comment about what would happen to IHL if the international community did nothing on the issue of cluster munitions ignored the fact that proliferation has already occurred. At least 80 countries, as well as non-State actors have stockpiles of these weapons. Thus, it is unclear how the creation or absence of new law would affect proliferation. He added that, if the current problem was "non-compliance" with existing law, then any new law would still leave the issue of non-compliance unresolved.

It was the view of one participant that it is unfortunate that the meeting had dealt separately with the technical, military, and IHL aspects of cluster munitions. He advocated for a more integrated approach in future discussions, as the three aspects would interact when the weapons are used.

SESSION VI - CHALLENGES AND SOLUTIONS

DISCUSSIONS ON THE WAY FORWARD IN ADDRESSING THE ISSUE OF CLUSTER MUNITIONS

While there were no formal presentations in this session, Germany presented a proposal for a "draft CCW-Protocol on Cluster Munitions", and France introduced a draft non-paper outlining its preliminary views on the way ahead and the possible features of a future CCW instrument on cluster munitions (both are included on the attached CD-ROM). A Norwegian participant provided views on the way forward based on commitments contained in the Oslo Declaration on Cluster Munitions, and the Coordinator of the June 2007 CCW Expert Meeting devoted to cluster munitions outlined his ambitions for that meeting. Discussions centred on reactions to these papers, thoughts on what needs to be done to address the problems caused by cluster munitions, and the process by which further measures should be developed.

Elements of new rules

Several participants expressed the view that there is no doubt about the need for new rules on cluster munitions, and that momentum is growing among States, NGOs and international organizations to achieve this by the end of 2008. One participant recalled that the UN had appealed for a freeze on cluster munition use in 2003 and that the new UN Secretary-General has said he is encouraged by the new initiatives in this area. Some participants emphasized the importance of preventing future escalation of the problem, in terms of both the clearance burden and proliferation to additional countries and armed groups. They added that while existing IHL rules are fine, they will not be enough to prevent future tragedies.

A number of participants highlighted specific measures which they thought should form part of a future legal instrument. These include:

- A prohibition on the use, development, production, acquisition and transfer of cluster munitions;
- Measures to improve the reliability, accuracy and operation of authorized cluster munitions;
- Restrictions on the use of cluster munitions against military objectives located within or near populated areas;
- Provisions for the destruction of cluster munition stockpiles and for the clearance of cluster submunitions that have become explosive remnants of war;
- Transition periods for the implementation of some obligations;
- Procedures for compliance monitoring, sanctions and compensation;
- Mechanisms for cooperation and assistance, including victim assistance.

It was highlighted that the solution to this problem must be based on the known characteristics and impact of cluster munitions seen in affected countries. One participant observed that no satisfactory or sufficient technical solutions are immediately available. The cluster munitions to be prohibited were described by participants in a variety of ways, such as "inaccurate and unreliable cluster munitions"; "cluster munitions that have an indiscriminate, wide-area effect and that produce a large number of duds"; "cluster munitions that are likely to cause unacceptable harm to civilians".

One participant felt that cluster munitions pose not only a humanitarian problem, but also military and political disadvantages and costs for States, in terms, for example, of post-conflict clearance and proliferation to non-State actors. He further asked how governments could argue that the existing rules are adequate and merely need to be implemented properly when these rules do not seem to have been effective in dealing with the cluster munition problem as evidenced on the ground. Another participant underlined that the State that he represented had decided that cluster munitions are counter-productive to its political aims. Ultimately, the decision to take action is a political one and military needs and utility should be determined on the basis of political objectives, not the other way around.

In the view of one participant, there has not been a better case for new rules on a specific weapon since the prohibition of anti-personnel mines took effect. He agreed that there are challenges to overcome, but reminded participants that States have succeeded in rising to such challenges in the past. This was supported by another participant, who referred to the positive results that the Ottawa Convention (a process that began in the CCW and ended up in an alternative process) has had in the 10 years since its adoption, including in strengthening IHL. The ban on antipersonnel mines has created an expectation that particular weapons issues can be effectively addressed by States.

Focus on existing law

A number of participants had a different view and argued that existing IHL is adequate and that the solution is to be found in the strict implementation of these rules, which include the new standards established in the Protocol on Explosive Remnants of War. It was also stressed that those supporting new rules need to acknowledge that States have different security interests and that cluster munitions play a role in meeting these. States have a legitimate right to self-defence, and there is a need to balance military and humanitarian concerns. The use of cluster munitions to defend national territory was specifically mentioned in this context. At the same time, most agreed that both military utility and humanitarian problems must be recognized and addressed. The importance of considering States' technical and financial limitations was also mentioned. One participant maintained that assistance and cooperation are essential obligations of the international community, regardless of any future instrument and that addressing this is the way forward. While not necessarily supporting any new rules, a participant pointed out that it is nevertheless important to have some concrete proposals on paper to have an idea of what the norms being advocated would look like.

Reactions to the German draft

Many participants welcomed the German text and its ambition to put forward concrete proposals on the cluster munitions problem. They looked forward to examining the text in more detail after the meeting. Several participants gave preliminary reactions to the text. While recognizing its positive elements, some felt
that the draft protocol also reflects a number of flawed concepts. For example, participants questioned the use of the term "dangerous dud rate" and the requirement to achieve a failure rate below 1%, saying that such ideas had been challenged by the discussions in other sessions. One

participant stressed that he thought States should be allowed to keep "good" cluster munitions, but that no one has yet provided a specific example of an explosive cluster munition that does not cause unacceptable harm to civilians. In light of the urgency of the problem, concerns were also raised about proposals for a transition period of up to 10 years before all cluster munitions would be prohibited. Another participant commented that the German text lacked language on victim assistance and should refer to the UN Disability Convention. The limited provisions on clearance, and in particular the lack of clearance deadlines, were also mentioned. According to one participant, it was unrealistic to think this proposal would succeed in the CCW, as it would be too little for many and too much for some.

The CCW and the Oslo Declaration

With regard to the process, a range of views were expressed. A number of participants thought the CCW would be the best forum in which to deal with this issue as it has the requisite expertise and the main users and producers of cluster munitions are represented. One participant argued that the objective of minimizing the humanitarian impact could not be achieved without involving the main users and producers. It was pointed out that the CCW is a credible forum that has been able to achieve meaningful results in the past, such as the Protocol on Explosive Remnants of War. Several participants also thought that a strong mandate to start negotiations on a new IHL instrument should be prepared by the Group of Governmental Experts in June and adopted at the Meeting of States Parties in November 2007. They expressed their hope that States would address this constructively in the CCW. Another participant stressed that it would not matter if the CCW takes longer to adopt a protocol on cluster munitions, even a weaker protocol, as long as it moves in the right direction.

The Chair of the upcoming meeting of the CCW Group of Governmental Experts informed participants that the June meeting would likely be organized around three main themes: 1) definitions, 2) technical specifications, and 3) humanitarian aspects of use. The aim of the work would be to prepare recommendations for the meeting of States Parties, including a proposal to launch negotiations of a legally binding instrument with a predefined timeline.

Some participants underlined that while it would be desirable for this issue to be addressed within the CCW framework, it has been difficult to make progress on certain issues in this context. This was primarily attributed to the CCW's practice of taking decisions by consensus. The inability of the CCW to negotiate a protocol on anti-vehicle mines after 5 years of discussions was cited as an example. Cluster munitions have also been on the CCW's agenda for several years but little progress has been made on this issue so far. It was argued that the CCW could not respond with the urgency and quality required to address this pressing humanitarian concern, and that States should not continue technical discussions with no specific objective.

A participant asked why States think that the CCW could now successfully negotiate a new instrument on cluster munitions when it was unable to do so for anti-vehicle mines, considering that anti-vehicle mines were already partially regulated by the CCW and viewed as less valuable by the military than cluster munitions? The way forward, this same participant asserted, has already been identified in five follow-up meetings to the Oslo Conference on Cluster Munitions.

It was also underlined that adherence to the CCW is far from universal and that few developing countries are represented in its meetings. A comparison was made to the Ottawa Convention, which has more than 150 State Parties. Several participants stressed the need to engage developing countries in any process to address this issue, since most countries affected by cluster munitions are developing countries. The need to incorporate clearance expertise was also mentioned. It was also noted that roughly half of the producers of cluster munitions have supported the Oslo Declaration, in addition to a number of affected countries and several States not party to the CCW.

Many comments were made on the relationship between the CCW and the work of meetings pursuant to the Oslo Declaration. The different imperatives, roles and priorities that guide these two processes were highlighted by one participant. There was nevertheless wide agreement that the CCW discussions on cluster munitions and the next meetings of States committed to the Oslo Declaration should be seen as mutually reinforcing and not as competing tracks. Several governmental participants expressed their intention to participate in both processes.

CLOSING COMMENTS BY THE ICRC

The ICRC is grateful to the *rapporteurs* for their excellent synthesis of discussions on the main themes of this meeting and for the comments on these reports by participants. These closing reflections by the ICRC are therefore not intended as a further summary of the proceedings. Instead we would like to make some observations about what we have heard and what we take away from this dialogue.

When the ICRC's Director, Dr. Philip Spoerri, opened this meeting he expressed the hope that all participants would *"be ready to ask new questions, to listen and to leave with deeper insights, more informed views and better solutions than we came here with"*. The quality, depth, and frankness of the discussion over the past three days give us reason to believe that these objectives have been achieved.

The work of this meeting was not aimed at the production of a set of conclusions by participants. It has rather been to provide information on the effects of cluster munitions on civilian populations, to facilitate better understanding of the military role of these weapons and their technical evolution, and to evaluate possible solutions. It is now primarily the responsibility of States to weigh what they have heard here, to make political judgements about what is acceptable, and to take action. The ICRC hopes that the insights gained from this meeting will inform both the development of national policy on the cluster munitions issue as well as the work of upcoming multilateral meetings. To this end, the ICRC will make the content and insights generated by this meeting available, in the form of a public report, to a much wider circle of interested States and organisations.

For the ICRC, a theme which permeated every discussion in this meeting was the need for a "reality-based" approach to addressing the long-standing problem of cluster munitions and to finding possible solutions. The reality of the severe human costs of these weapons was laid out in considerable detail in the first two presentations and in the interventions by experts dealing with the problem on the ground. However, the discussions and *rapporteurs'* summaries have highlighted that a similar "reality-based" approach needs to be applied to other issues under consideration:

- The relative military value of cluster munitions needs to be further examined. This examination needs to be based not only on the doctrine and theory underlying the use of such weapons but also on the actual military effectiveness and consequences of the use of cluster munitions in past conflicts.

- Proposed technical solutions, such as improvements in reliability and accuracy and the integration of self-destruct features, need to be examined not only on the basis of how these technologies are designed to function (or function under testing conditions), but also need to take into account how they will function under actual conditions of use.

- New norms of international humanitarian law intended to resolve the problems caused by cluster munitions need to integrate legitimate military needs and be clearly stated so they will be effectively implemented by military forces. Clear rules will also facilitate broad adherence to a new instrument.

- If urgent action to address this problem is not pursued, the potentially horrific consequences of the proliferation and use of existing cluster munition stockpiles needs to be constantly borne in mind.

It has also become clear that there will be challenges in arriving at a precise but generic legal definition of those cluster munitions which have caused the greatest humanitarian problem. On the other hand, it has been pointed out that both military and clearance experts are well aware of the serious problems of reliability and accuracy of many specific models. It is these which have littered the landscapes of many of the countries in which they have been used. Getting rid of what has been called "the bad stuff", through decommissioning and destruction, should be the first step by countries which recognize the humanitarian problem. Progress in addressing this problem does not need to wait for the negotiation of a new treaty. Rather, such a treaty should solidify and extend the progress already made.

In considering the potential role of independent national actions we would like to commend the decisions by several countries to enact moratoria on the use of cluster munitions and the commitment of others to eliminate those models in their stockpiles which they consider to be inaccurate or unreliable. These are just the types of actions which can and should be taken by additional States.

In his presentation, the *rapporteur* on military aspects presented us with a sober choice. Reflecting on the argument that the rules of IHL are adequate and have been stringently applied to the use of cluster munitions, he arrived at the logical conclusion about the high level of civilian casualties we have so often witnessed:

"Either we accept that such casualties are inevitable, given the competing principles of humanity and military necessity, and that the commanders were aware that cluster munition use could create such humanitarian damage ***or*** *we accept that there is a need for clearer guidelines and regulations on how such weapon systems might be deployed, if at all."*

This is indeed the choice before us now. How we answer it will say a lot about who we are, as individuals, as States, and as an international community with a responsibility to protect civilians in the face of the horrors of war.