

Sensor-fuzing and SMARt submunitions

An unproven technology?

This paper highlights gaps in the current public understanding of sensor-fuzed weaponry, specifically the SMARt range of cluster munitions.

In situations where sensor-fuzed submunitions have been used in combat there is a lack of information regarding the outcome of those deployments. This raises a number of concerns. It can be reasonably assumed that it would be in the interest of the users and manufacturers of these weapons to advertise if those deployments had been militarily effective, were not indiscriminate, left no unexploded remnants and had no immediate or persistent impact on non-combatants. In the absence of such information, it is essential to pose questions regarding untried sensor-fuzed cluster munitions.

This paper focuses on aspects relating to SMARt submunitions that have an immediate and urgent relevance to the Oslo Process for three key reasons:

1. SMARt munitions have either been procured or are in the procurement process by a number of States participating in the Oslo Process as well as by various states outside the Process;
2. SMARt munitions incorporate a number of characteristics that in combination provide a basis on which States continue to argue for a broad exception within the treaty, or alternatively that these weapons should fall outside the treaty definition;
3. The SMARt 155 is the only version of the SMARt system that has been discussed in any detail during the Oslo Process; it has been presented as a template for acceptable cluster munitions. However, other versions of SMARt munitions are in the process of development.

Current arguments specifically in support of the SMARt 155 can be summarised as follows:

- **Sensor fusing** addresses the concerns related to the indiscriminate nature of cluster munitions;
- **Small numbers of submunitions** in one SMARt 155 artillery round present none of the wide area, indiscriminate or remnant problems related to other types of cluster munitions;
- SMARt 155 has been developed as an **anti-tank weapon**;
- The SMARt 155 has undergone an **adequate testing regime** to confirm its reliability.

This paper challenges these four assertions based on available documentation from a number of government and manufacturer sources by posing questions that remain unanswered. In doing so, this paper highlights the dangers of accepting that the SMARt155,

or any other cluster munition yet to be used in battlefield conditions, should fall outside the prohibition.

1. *Sensor fusing* addresses the concerns related to the indiscriminate nature of cluster munitions

Firstly, the SMArt 155 targeting relies on a tri-mode sensor capability, which includes a passive infrared (IR); a passive 94 GHz Millimetre Wave (Radiometer); and an active 94 GHz Millimetre Wave (Radar).

However, it is unclear how the three sensors interact and therefore how they rely on one another for successful functionality. This therefore raises a number of discrimination questions. Which of the sensors has primacy in the process of target acquisition? More specifically, how do the sensors interact to acquire a target?

In addition, the SMArt 155 is designed to acquire a target in a single pass.ⁱ Therefore, what level of certainty must exist to confirm a target and equally, what level of uncertainty would initiate self-destruction or actively reject a target?

In order to evaluate this weapon, there must be a clear understanding of how capable the system is of differentiating between civilian and military targets within a mixed battlefield environment. To date, there has been no clarity on this issue. Furthermore, it has been argued, in discussion with one user government, that the only way of verifying this differentiation is in actual use. This sits in stark contrast to the ICRC position: “...in light of the differences between the failure rates seen in testing and those documented in combat situations, states proposing such exceptions should demonstrate that these approaches will function in the reality of armed conflict and not only in the ideal circumstances of testing scenarios”.ⁱⁱ

Moreover, a number of sources have suggested that the tri-sensor has the capacity for adjustment to meet various battlefield conditions and therefore a variety of targets.

Lastly, claims have been made asserting that sensor-fuzed weapons exist as a specific munitions category, within which SMArt munitions should fall. In reality, no genre of weapon exists; the only common factor being that sensors are used to direct submunitions to a target. Therefore, an exclusion from an international ban cannot be based on the presence of a sensor(s), regardless of other intrinsic properties.

2. *Small numbers of submunitions* in one SMArt 155 artillery round present none of the wide area, indiscriminate or remnant problems related to other types of cluster munitions

The Australian Defence Force has claimed: “[the] SMArt 155 is fundamentally different. It is highly sophisticated, discriminating, accurate and reliable, and takes advantage of a range of technologies and design features which help to minimise any potential impact on civilians. Unlike cluster munitions of humanitarian concern, which can have hundreds of submunitions, the SMArt 155 comprises only two projectiles.”ⁱⁱⁱ

However, the SMArt submunitions used in the SMArt 155 are being adapted for use in Guided Multiple Launch Rocket System (GMLRS) M30 rockets. “The SMArt submunition is under BWB contract to be adapted and qualified with GMLRS. Adaptation will be completed in 2007. Qualification will take place in 2008. Fielding of GMLRS SMArt submunitions is

scheduled 2009/10.”^{iv} With only minor modifications, 4 SMARt submunitions can be accommodated for deployment within a single M30 rocket.^v This not only instantly doubles the number of submunitions per rocket, but given that the GMLRS deploys large numbers of rockets in a single fire mission, the number of submunitions deployed over the target area will be dramatically increased.

“The German government has placed a contract to incorporate SMARt submunitions into the warhead of the US-made GMLRS. The order underscores the continued significance of SMARt 155 intelligent sensor-fused submunitions for artillery forces, as well as laying the groundwork for integrating them into other weapon systems”.^{vi}

Will the proliferation of SMARt submunitions within a wide range of weapon systems result in an increasing reliance by armed forces on unproven and inadequately tested sensor-fused weapons?

3. SMARt 155 has been developed as an anti-tank weapon

While some user countries have described the SMARt 155 as an anti-tank weapon, this needs to be clarified; assertions have been made by manufacturers indicating SMARt submunition capabilities for use against a wider range of targets.

Rheinmetall asserts that *“[a] single volley of SMARt projectiles is capable of successfully defeating stationary or moving target scenarios containing main battle tanks as well as high value mobile targets like self propelled howitzers, armoured personnel carriers, command vehicles as well as rocket launchers and air defense units”*.^{vii}

Moreover, the manufacturer's timeline for SMARt submunitions development refers to production of a SMARt combined effects munition,^{viii} and it has also been stated that *“...GIWS continues investing in the future of SMARt 155 with new warhead developments to enable engagement of hard, semi-hard and materiel targets and enhanced sensor suite performance for all kinds of environmental challenges. Whether aimed at combat scenarios or aimed at asset protection for homeland defense,...”*^{ix}

The range of targets potentially acquired, using the existing submunition, appear not to be confined to tanks.

Given the wide range of target profiles which the SMARt submunition is able to acquire what reassurances guarantee that confusion between civilian and military vehicles and property can be avoided?

4. The SMARt 155 has undergone an *adequate testing regime* to confirm its reliability

To date, testing of the SMARt 155 has only been undertaken in controlled and unrealistic circumstances.

In June 2005, delegates from Australia, Germany, India, Peru, Switzerland and the UAE attended a SMARt munitions trial by the German Bundesamt Furvehrtechnik und Beschaffung (the Federal Office of Defence Technology and Procurement). A report of the trial stated: *“...the trial was a complete success (100 percent functionality, 24 SMARt rounds fired for 29 target hits) and follows on from years of additional trials in the US, Germany, Switzerland and the UAE against a variety of targets in various environmental, operational,*

complex tactical targets and engagement scenarios demonstrated sustained performance and warhead effectiveness expected by today's defence forces".

It must be noted that of the 48 submunitions contained in the 24 rounds fired, 19 are unaccounted for in this report. Australian Government representatives indicated that these 19 submunitions "failed to acquire a target", yet were unable to clarify whether those submunitions had self-destructed, could be accounted for by multiple hits on the 29 targets, or fell outside the trial footprint.

The above trials appear only to address the SMARt 155's military effectiveness. Given the widely accepted concerns involved with unrealistic testing scenarios, what trials been undertaken to test the SMARt 155's performance on typical modern battlefields (mixed civilian/military scenarios) or to evaluate its more general propensity for humanitarian impact?

To conclude, there is a clear lack of information regarding sensor-fuzed and SMARt submunitions. The questions raised in this document must be answered before any level of exemption is considered within the Oslo Process for sensor-fuzed and SMARt munitions.

Austcare and Handicap International are member organisations of the Cluster Munition Coalition (CMC).

ⁱ 'Rocket Artillery in Future Scenarios, First Scenario', Diehl BGT DefenceSingle, April 2007, www.dtic.mil/ndia/2007gun_missile/GMWedAM2/WichPresentation.pdf.

ⁱⁱ ICRC, Comments of the ICRC on the Wellington draft of a future cluster munitions convention, 8 February 2008.

ⁱⁱⁱ Australian Department of Defence, 3 October 2007, <http://www.defence.gov.au/media/departmentaltpl.cfm?CurrentId=7131>

^{iv} Rheinmetall Defence press release, 27 March 2006, www.rheinmetall-detec.de/index.php?lang=3&fid=3479.

^v 'Rocket Artillery in Future Scenarios, First Scenario', Diehl BGT DefenceSingle, April 2007, www.dtic.mil/ndia/2007gun_missile/GMWedAM2/WichPresentation.pdf.

^{vi} Rheinmetall Defence press release, 21 February 2007.

^{vii} 'SMARt 155 sensor-fuzed munition for the Army', Rheinmetall Defence 4 December 2004.

^{viii} 'Rocket Artillery in Future Scenarios, First Scenario', Diehl BGT DefenceSingle, April 2007, www.dtic.mil/ndia/2007gun_missile/GMWedAM2/WichPresentation.pdf.

^{ix} 'Diehl positions SMARt 155 for Land 17', Australian Defence Magazine, [http://www.australiandefence.com.au/adm/index.cfm/p/archives.detail/objectID/6223E73A-65BF-75E5-C20B55A97D2EE034/pageno/1?search=&relatedPub=&page=49&exactphrase=.](http://www.australiandefence.com.au/adm/index.cfm/p/archives.detail/objectID/6223E73A-65BF-75E5-C20B55A97D2EE034/pageno/1?search=&relatedPub=&page=49&exactphrase=)