



**UNIDIR**

UNITED NATIONS  
INSTITUTE FOR  
DISARMAMENT  
RESEARCH

**Opportunities to strengthen military  
policies and practices to reduce civilian  
harm from explosive weapons**

**Food-for-Thought Paper**

Roger Lane and Himayu Shiotani

## **ACKNOWLEDGEMENTS**

Support from UNIDIR core funders provides the foundation for all the Institute's activities. This research is supported by the Government of the Federal Republic of Germany.

## **ABOUT UNIDIR**

The United Nations Institute for Disarmament Research (UNIDIR)—an autonomous institute within the United Nations—conducts research on disarmament and security. UNIDIR is based in Geneva, Switzerland, the centre for bilateral and multilateral disarmament and non-proliferation negotiations, and home of the Conference on Disarmament. The Institute explores current issues pertaining to a variety of existing and future armaments, as well as global diplomacy and local tensions and conflicts. Working with researchers, diplomats, government officials, NGOs and other institutions since 1980, UNIDIR acts as a bridge between the research community and Governments. UNIDIR activities are funded by contributions from Governments and donor foundations.

## **NOTE**

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. The views expressed in the publication are the sole responsibility of the individual authors. They do not necessarily reflect the views or opinions of the United Nations, UNIDIR, its staff members or sponsors.

## **CONTRIBUTORS**

The authors would like to thank the following for their contributions: Adam Jux, Al Thickett, Bob Bowman, Christine Wille, Adolf Bruckler, Emma Cunliffe, Ezequiel Heffes, Paul Fox, Emile Richter, Fredrik Wallenberg, Geir Odegaard, Huw Lawford, Kathleen Lawand, Kojo Brew Acquaisie, Larry Lewis, Max Schilcher, Michael Naah, Mike von Bertele, Sandra Bialystok, Norm Seip, Ralph Jodice, Ralph Mamiya, Roly Evans, Sahr Mohammedally, Simon Bagshaw, Simon Mulongo, Stu Russell, Tracy Cheasley, William Mansfield, Kim Kirstensen, Patrick Cammaert and a number of serving officers who wish to remain anonymous. The authors also thank UNIDIR staff who supported and guided this research, in particular Renata Dwan, Jared Rigg and Alfredo Malaret.

## Outline

This research seeks to support efforts to reduce civilian harm from the effects of explosive weapons in urbanized environments. The paper is designed to stimulate thinking among military subject matter experts and selected representatives of international and non-governmental organizations ahead of a workshop in Geneva on 24 September 2019, the objective of which is to identify practical measures to support an Options Paper for consideration by armed forces. This research frames the issue of explosive weapons in the broader context of protection of civilians and civilian harm mitigation. The research focuses on multilateral operations.

The paper takes an *Enterprise Risk* perspective—i.e. seeking to understand where the risks and uncertainties lie in the entire civilian harm mitigation ‘life cycle’, from planning, intelligence collection, target development and weaponing, and target engagement, to battle damage assessment and lessons identified. This comprehensive life-cycle approach reflects care in civilian protection being taken at all points in the planning and use of military force and includes learning loops so that militaries can adapt and improve to overcome risks and challenges. Each section contains a set of guiding questions to promote thinking.

The paper accepts that the type of urbanized environments and mandates under which multilateral organizations, such as the United Nations, NATO, the European Union, AMISOM or G5 Sahel are very different, so that no one solution will fit all or be appropriate.

**Section 1** sets the operational environment for the research, including working definitions of explosive effects.

**Section 2** focuses on the challenges in “Planning and Formulating a Mandate”—the multiplicity of actors in a chaotic space; possibility of differing levels of compliance with international humanitarian law; the opportunities and challenges that non-State armed groups present when conducting operations, sometimes as a partner to a State actor; the challenges posed by the obligations of cultural property protection and the abuse of cultural property through explosive weapons to intimidate and coerce a civilian population; as well as recognition of the dynamic nature of conflicts as warring parties seek an advantage over their opponents and its implications for formulating a mandate, planning and resourcing capabilities.

**Section 3** is focused on “Intelligence” and the central role it plays in military decision-making and risk management. The section stresses the importance of data-sharing to avoid unnecessary harm to the civilian population and humanitarian actors, acknowledging the challenges this presents.

**Section 4** entitled “Target Development and Weaponing” focuses on the reliability and accuracy of information; target vetting and collateral damage estimate methodologies, as well as close combat challenges.

**Section 5** focuses on “Target Engagement”, the process of physically attacking a target and asks questions of pre-deployment training, challenges of delivering precautionary warnings, and artillery procedures. It also recognizes the challenge of maintaining positive identification of a target in an urbanized environment.

**Section 6** focuses on “Battle Damage Assessment (BDA) and Lessons Identified” processes, asking questions of accessibility to the damaged sites for assessment purposes and victim assistance, as well as what opportunities might exist to strengthen institutional learning.

The research has included informal consultations with stakeholders, literature review and questionnaires.

The desired outcome is for the workshop to identify opportunities in seven areas of capability development for consideration in an Options Paper in October 2019. These areas are doctrine, policy, organization, training, leadership, equipment and facilities.

## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	NATURE OF THE PROBLEM .....	1
1.2	EFFECTS OF EXPLOSIVE WEAPONS IN URBANIZED ENVIRONMENTS ....	1
1.3	POTENTIAL CAUSES OF CIVILIAN HARM IN URBANIZED ENVIRONMENTS.....	1
1.4	APPLICABILITY OF IHL TO TARGETING .....	2
1.5	MULTILATERAL INITIATIVES TO REDUCE CIVILIAN HARM .....	2
1.6	MILITARY INITIATIVES TO REDUCE CIVILIAN HARM .....	3
1.7	MORE NEEDS TO BE DONE.....	3
1.8	ABOUT THIS RESEARCH .....	4
1.9	METHODOLOGY AND FRAMEWORK .....	4
1.10	WORKING ASSUMPTIONS.....	5
1.11	LIMITATIONS .....	5
1.12	WORKING DEFINITIONS.....	5
	1.12.1Urbanized environment.....	5
	1.12.2Accuracy.....	6
	1.12.3Civilian harm .....	6
	1.12.4Civilian harm mitigation .....	6
	1.12.5Collateral damage .....	6
	1.12.6Explosive primary effects.....	6
	1.12.7Explosive secondary effects.....	6
	1.12.8Explosive tertiary effects.....	6
	1.12.9Precision.....	6
<b>2</b>	<b>Planning and Mandate Formulation .....</b>	<b>7</b>
2.1	UNDERSTANDING THE NATURE OF THE PROBLEM .....	7
	2.1.1 Conceptual understanding .....	7
	2.1.2 Analytical tools.....	8
	2.1.3 Multiple actors in a chaotic space .....	9
	2.1.4 Proxy wars and NSAGs .....	9
	2.1.5 Are the armed actors likely to comply with LOAC/IHL? .....	10
	2.1.6 Cultural property protection.....	10
	2.1.7 Target set development in planning.....	10
2.2	EVOLUTION OF MILITARY CAMPAIGNS .....	10
2.3	CONDUCT OF OPERATIONS IN URBANIZED ENVIRONMENTS.....	11
2.4	RESOURCING CAPABILITIES TO MATCH THE MANDATE.....	12

2.4.1 Military requirements .....	12
<b>2.5 PARTNERING CONSIDERATIONS AND NSAGS .....</b>	<b>13</b>
2.5.1 Partnering considerations .....	13
2.5.2 Obligations of States and NSAGs .....	13
2.5.3 Mechanisms for engaging with NSAGs .....	13
<b>3 Intelligence .....</b>	<b>16</b>
<b>3.1 ESTABLISHING INTELLIGENCE COLLECTION CAPABILITIES AND PRIORITIES.....</b>	<b>16</b>
3.1.1 Prioritize collection early .....	16
3.1.2 Intelligence updates in dynamic situations.....	16
3.1.3 Intelligence databases—challenges .....	17
3.1.4 Appropriate sensor/source.....	17
<b>3.2 COMPREHENSIVE UNDERSTANDING OF THE OPERATIONAL ENVIRONMENT.....</b>	<b>17</b>
3.2.1 Military intelligence support to operations .....	17
3.2.2 Population-centric scenario development.....	18
<b>3.3 DATA GOVERNANCE .....</b>	<b>18</b>
3.3.1 Trust 18	
3.3.2 Purpose.....	19
3.3.3 Data security .....	19
3.3.4 Data quality and quantity.....	20
3.3.5 Timely exchange of information relating to targeting.....	20
3.3.6 Data management support to target development .....	21
<b>4 Target Development and Weaponering.....</b>	<b>22</b>
<b>4.1 POLICY DIRECTION.....</b>	<b>22</b>
<b>4.2 RELIABILITY AND ACCURACY OF INTELLIGENCE .....</b>	<b>23</b>
<b>4.3 MAINTAINING CURRENCY OF INTELLIGENCE ON A PROPOSED TARGET .....</b>	<b>23</b>
<b>4.4 TARGETING CHOICES TO DELIVER EFFECTS.....</b>	<b>23</b>
<b>4.5 TARGET VETTING .....</b>	<b>24</b>
4.5.1 Target lists .....	24
4.5.2 Vetting .....	24
<b>4.6 COLLATERAL DAMAGE ESTIMATION.....</b>	<b>25</b>
4.6.1 Methodology.....	25
4.6.2 Tiered CDE approach.....	25
4.6.3 Limitations of tiered CDE approach.....	26
4.6.4 Known unknown risks in tiered CDE approach.....	26
4.6.5 Reverberating effects of explosive weapons .....	26

<b>4.7</b>	<b>CLOSE COMBAT CHALLENGES</b> .....	27
<b>5</b>	<b>Target Engagement</b> .....	<b>29</b>
<b>5.1</b>	<b>PREDEPLOYMENT TRAINING</b> .....	29
<b>5.2</b>	<b>MANAGEMENT OF AMMUNITION</b> .....	30
<b>5.3</b>	<b>PRECAUTIONARY WARNINGS</b> .....	31
<b>5.4</b>	<b>ARTILLERY BALLISTIC COMPUTATIONS</b> .....	31
<b>5.5</b>	<b>CONFIRMATION AND MAINTENANCE OF PID AND POL</b> .....	32
5.5.1	Challenge of maintaining PID.....	32
5.5.2	Misidentification.....	32
5.5.3	PoL confirmation.....	32
5.5.4	Policy direction: “Presence of civilians is assumed” .....	33
5.5.5	Improving ways of protecting healthcare sites in conflict.....	33
5.5.6	Network approach to avoid misidentification.....	33
<b>5.6</b>	<b>ARTILLERY ADJUSTMENT OF FIRE</b> .....	33
<b>5.7</b>	<b>RECORDING MUNITION EXPENDITURE</b> .....	34
<b>6</b>	<b>Battle Damage Assessment and Lessons Identified</b> .....	<b>35</b>
<b>6.1</b>	<b>QUALITY AND ACCESSIBILITY OF INFORMATION AVAILABLE</b> .....	35
6.1.1	Quality and reliability of information available post-strike.....	35
6.1.2	Accessibility of information available .....	36
<b>6.2</b>	<b>TIMELINESS OF REPORTING</b> .....	36
<b>6.3</b>	<b>COMMUNICATING OUTCOMES OF ASSESSMENTS</b> .....	37
<b>6.4</b>	<b>AMENDS POLICY/VICTIM ASSISTANCE</b> .....	37
<b>6.5</b>	<b>ANALYSIS OF DATA TO INFORM LESSONS</b> .....	37
<b>6.6</b>	<b>LESSONS IDENTIFIED</b> .....	37
<b>7</b>	<b>Conclusions</b> .....	<b>39</b>

## About the research team

**Roger Lane** is a retired UK Royal Marines Major General who was engaged by the United Nations and African Union's Information Support Team to make recommendations to the indirect fire policy used by AMISOM in Mogadishu in 2010–2011, working in conjunction with the Center for Civilians in Conflict (CIVIC). He has had command of national and NATO forces in Afghanistan and was a NATO Senior Mentor developing their senior leadership for operational duties from 2008–2014. He is currently contracted to NATO's Joint Warfare Centre where he is the Senior Advisor on the design, development and delivery of their exercises for certifying Headquarters' for their operations. Working in partnership with CTS International, he provides training support to other Headquarters from the strategic to the tactical level, as well as commercial offerings to support individual, team and organizational change, including emergency disaster-management training.

**Himayu Shiotani** is a Programme Head for the Conventional Arms Programme at the United Nations Institute for Disarmament Research (UNIDIR). Since 2014 he has led the Institute's research on conventional weapons covering issues pertaining to arms trade, armed violence, explosive weapons as well as weapon and ammunition management including in West Africa, Central African Republic, Democratic Republic of Congo, Iraq, and Somalia. Prior to his work with UNIDIR, Himayu worked as a Research Associate at the James Martin Center for Nonproliferation Studies (CNS) in Monterey, California. Himayu holds a master's degree in International Policy Studies, with a Certificate in Nonproliferation Studies, from the Middlebury Institute of International Studies.

## List of acronyms and abbreviations

AMISOM	African Union Mission in Somalia
BDA	battle damage assessment
CDE	collateral damage estimation
CDEM	US Collateral Damage Estimation Methodology
CIVIC	Center for Civilians in Conflict
DPO	United Nations Department of Peace Operations
GICHD	Geneva International Centre for Humanitarian Demining
ICRC	International Committee of the Red Cross
IHL	international humanitarian law
IHRL	international human rights law
IO	international organization
ISAF	International Security Assistance Force
ISTAR	intelligence, surveillance, target acquisition and reconnaissance
MINUSMA	United Nations Multidimensional Integrated Stabilization Mission in Mali
NATO	North Atlantic Treaty Organization
NGO	non-governmental organization
NSAG	non-State armed group
NSL	No-Strike List
OCHA	Office for the Coordination of Humanitarian Affairs
PID	positive identification
PoC	protection of civilians
PoL	pattern of life
ROE	rules of engagement
SME	subject matter expert
UAV	unmanned aerial vehicle



# 1 Introduction

## 1.1 NATURE OF THE PROBLEM

Civilians in modern conflicts face a range of threats, including from the use of explosive weapons with wide-area effects in urban and other concentrated areas.

This is due to multiple factors. Modern armed conflicts are changing and have grown more complex. Conflicts have become asymmetrical, fragmented and protracted. They can take place in urbanized environments, with hostilities often being conducted in or near populated areas, which include a concentration of civilians and civilian objects. The increased prevalence of non-international armed conflict, in which the parties to conflict include violent extremist groups, proxy forces, and groups with blurred political as well as criminal agendas, exacerbates the challenge of protecting civilians from the effects of armed conflict. Contemporary adversaries are often non-State armed groups (NSAG), which may exploit proximity to civilians and critical infrastructure for their own ends and may not respect international humanitarian law (IHL).

An International Committee of the Red Cross (ICRC) and InterAction report estimates that 50 million people worldwide are affected by conflict in cities and estimate that 60 per cent of the world's population will live in cities by 2030,<sup>1</sup> while a workshop convened by Article 36 and the Center for Civilians in Conflict (CIVIC) reflected that the “complexity of conflict is compounded by the intermingling of combatants and military objectives with civilians and civilian objects (whether intentional, unintentional or forced)”.<sup>2</sup>

Where civilians are displaced and are temporarily resident in another urban or concentrated area, they are likely to become more vulnerable. For example, in Syria there are many cases where people have been displaced multiple times by fears of insecurity,<sup>3</sup> potentially making the notion of an urbanized environment quite fluid.

## 1.2 EFFECTS OF EXPLOSIVE WEAPONS IN URBANIZED ENVIRONMENTS

Explosive weapons are designed to deliver different effects, the principal ones being **blast over-pressure, fragmentation, heat and light**. Blast refers to “high-pressure blast waves moving at supersonic speed”.<sup>4</sup> Blast over-pressure affects humans and structures; the former especially affecting the lungs and other hollow organs caused by their rapid compression and re-inflation. Research indicates that the reverberating and reflective blast waves developed in enclosed spaces are significantly more dangerous than in open areas.<sup>5</sup> The explosive disintegration of the weapon/munition sends supersonic **fragments** of the casing outwards from the point of detonation. The likely effects are multiple penetrating wounds, the extent of the injuries being determined by the amount of exposure of the body area, the posture of the body and the nature and speed of the fragments. **Thermal** effects are caused by the release of energy during detonation and may cause firebrands,<sup>6</sup> causing burns to civilians or ignition of structures. The flash of the explosive detonation may cause additional injuries from the **light** it generates. Blast and fragmentation are the principal causes of casualties. These primary effects may be magnified in urbanized environments where flying glass, debris or collapsing structures cause secondary effects. Tertiary effects are those which are the indirect results of an explosive weapon that negatively impact on the social, economic and physical and mental well-being of civilians.

## 1.3 POTENTIAL CAUSES OF CIVILIAN HARM IN URBANIZED ENVIRONMENTS

There are multiple reasons why the risk of civilian harm from explosive weapons may be increased. These range from systemic<sup>7</sup> to random<sup>8</sup> errors in weapon systems; inadequate targeting directives; target

---

<sup>1</sup> Outcome Report When War moves to Cities: Protection of Civilians in Urban Areas, ICRC and Interaction, May 2017.

<sup>2</sup> Report on a workshop examining military policies and practices on the use of explosive weapons in populated areas, Article 36 and CIVIC, 2–3 May 2018. Available from <http://www.article36.org/explosive-weapons/mil-workshop-report/>.

<sup>3</sup> B Almeras, “Everywhere the bombing followed us”, Humanity & Inclusion, September 2017. Available from [http://blog.handicap-international.org/influenceandethics/wp-content/uploads/sites/4/2018/01/Study2017\\_interview-4\\_afisa\\_EN\\_newcharte\\_WEB.pdf](http://blog.handicap-international.org/influenceandethics/wp-content/uploads/sites/4/2018/01/Study2017_interview-4_afisa_EN_newcharte_WEB.pdf).

<sup>4</sup> “Explosive Weapon Effects, Final Report”, GICHD, February 2017.

<sup>5</sup> Ibid.

<sup>6</sup> Fragments that are heated to a very high temperature may cause flammable materials to catch fire.

<sup>7</sup> Examples of systemic errors include errors in wind estimation or under-weight munitions.

<sup>8</sup> Examples of random errors include those resulting from poor quality control procedures or inconsistencies in the type and amount of propellant used.

misidentification; target location errors; inadequate characterization of structures; poor understanding of area utilization; the challenge of knowing whether civilians are in a specific building or the extent to which a building is underground or is connected via subterranean structures; lack of choice in weapons to deploy; weapons failures, poor selection of performance of fuzes; poor training and leadership; congested electromagnetic spectrum; adversaries using civilians as human shields; adversaries using civilian clothes; inadequate collateral damage estimation and many more. This diverse set of risks raises important questions about how Parties to conflict adapt their military policies and practices to address risks, understand impacts, and mitigate civilian harm from the effect of explosive weapons in urbanized environments.

#### 1.4 APPLICABILITY OF IHL TO TARGETING

Military forces engaged in operations are *inter alia*, subject to the Laws of Armed Conflict (LOAC)/International Humanitarian Law (IHL). For the purposes of this paper, the key obligations regarding targeting are those of **Proportionality**, **Necessity**, **Distinction** and **Unnecessary Suffering**, but they are underpinned by a series of Rules, such as **Definition of Civilian Objects**, (Rule 9), **Principle of Precaution in Attack** (Rule 15), **Target Verification** (Rule 16), **Assessment of the Effects of Attacks** (Rule 18), **Target Selection** (Rule 21) and **Removal of Civilians and Civilian Objects from the Vicinity of Military Objectives** (Rule 24).<sup>9</sup>

#### 1.5 MULTILATERAL INITIATIVES TO REDUCE CIVILIAN HARM

Various States,<sup>10</sup> international organizations (IOs) and non-governmental organizations (NGOs) have been particularly active in efforts to bring attention to measures in reducing harm to civilians from the effects of military operations in urbanized and other concentrated areas. Since 2009, the United Nations Secretary-General has consistently raised awareness of this issue in his reports to the Security Council on protection of civilians in armed conflict.<sup>11</sup> His 2018 Agenda for Disarmament<sup>12</sup> called for the development of appropriate limitations, common standards and operational policies to protect civilians from the impact of explosive weapons with wide-area effects in populated areas.<sup>13</sup>

Other examples include the Office for the Coordination of Humanitarian Affairs (OCHA)'s compilation of Military Policy and Practice.<sup>14</sup> The ICRC has run a programme called "War in Cities",<sup>15</sup> which began in 2017, comprising a series of high-level public events and expert meetings. Save The Children, working with the Paediatric Blast Injuries Partnership, have created a Paediatric Blast Injury Manual<sup>16</sup> as a means of supporting fractured health systems under pressure from urban conflict, highlighting the extreme vulnerability of children, while the Geneva International Centre for Humanitarian Demining (GICHD) has conducted extensive research into the effects of explosive weapons,<sup>17</sup> modelling the use of different weapon systems in urbanized environments. Similar research has been undertaken by Armament Research Services.<sup>18</sup>

These efforts raise concerns about the efficacy of using explosive blast weapons in urbanized environments and the challenges associated with modelling the effects of such weapons. Other efforts, such as those by Geneva Call, have conducted outreach to NSAGs to convince them of the need for adherence to IHL and have

---

<sup>9</sup> The complete set of Rules are in the ICRC's database, accessible here: [https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1\\_rul](https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul).

<sup>10</sup> For example, "Champion States" of the Agenda for Disarmament on this topic—namely Austria, Ireland and New Zealand—have led efforts to develop an international political declaration on the protection of civilian from the use of explosive weapons in populated areas. In 2019 the Government of Austria is convening a conference on protecting civilians in urban warfare. The Government of Germany has led efforts to support the development of practical measures and operational policies, including through the Convention on Certain Conventional Weapons, and has organized a series of workshops in 2018 on this topic. At the 2018 session of the General Assembly First Committee, Ireland delivered a joint statement on behalf of 50 States calling for enhanced action on this topic.

<sup>11</sup> See <https://undocs.org/S/2019/373>.

<sup>12</sup> See <https://www.un.org/disarmament/sg-agenda/en/>.

<sup>13</sup> See Action 14 of the Agenda for Disarmament, <https://www.un.org/disarmament/sg-agenda/en/action/14>.

<sup>14</sup> Compilation of Military Policy and Practice: Reducing the humanitarian impact of the use of explosive weapons in populated areas, OCHA, Policy and Studies Series, August 2017.

<sup>15</sup> "War in the Cities", ICRC, 2017. Available from <https://www.icrc.org/en/war-in-cities>.

<sup>16</sup> The Paediatric Blast Injury Field Manual, Save The Children and Paediatric Blast Injury Partnership, 16 May, 2019, available from <https://resourcecentre.savethechildren.net/library/blast-injuries-impact-explosive-weapons-children-conflict>.

<sup>17</sup> Explosive Weapons Effects, Final Report, GICHD, February 2017.

<sup>18</sup> Dullum O et al., "Indirect Fire: A technical analysis of the employment, accuracy and effects of indirect-fire artillery weapon" ARES publication, January 2017. Available from <https://armamentresearch.com/publications/>.

used innovative tools, such as Deeds of Commitment, in which NSAGs enter an agreement to adopt the spirit of the Commitments, such as that to protect children in armed conflict.<sup>19</sup> Blue Shield International has raised the profile of cultural property protection and the implications for the protection of civilians.

## 1.6 MILITARY INITIATIVES TO REDUCE CIVILIAN HARM

Some militaries have also been active in their pursuit of compliance with LOAC and IHL to mitigate civilian harm. Examples include the African Union Mission in Somalia (AMISOM)'s indirect fire policy which created a Target Engagement Authority for differing levels of command to authorize the use of different weapon systems in urbanized environments, as well as the creation of a Civilian Casualty Tracking and Analysis Cell; the North Atlantic Treaty Organization (NATO)'s coordination of the deconfliction of humanitarian flights, shipping and road convoys to prevent unintentional strikes during Operation Unified Protector in Libya in 2011 with humanitarian actors; or the issuance of the International Security Assistance Force Tactical Directives,<sup>20</sup> which placed winning the support of the population by ensuring their protection in the conduct of hostilities at the heart of its strategy.

Some States have made institutional investments to create capabilities to better protect civilians. This includes the development of new munitions that reduce the level of collateral damage, such as the Very Low Collateral Damage Weapon (BLU-129)—a Mk82 bomb variant with a composite shell that disintegrates on detonation to minimize fragmentation, or the BLU-39 Small Diameter Bomb (SDB), which is a precision-guided glide bomb. These initiatives also include intelligence capabilities, software for collateral damage estimation and visualization of no-strike lists, and more stringent requirements to ensure that targeteers are properly trained, certified and re-certified to maintain currency.

## 1.7 MORE NEEDS TO BE DONE

Notwithstanding these and other efforts, concerns remain about the effects of explosive weapons in urbanized areas. On 30 July 2019, Mark Lowcock, Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator, briefed the Security Council,<sup>21</sup> citing comments from the High Commissioner for Human Rights from 26 July 2019 regarding the situation in Syria:

Despite repeated calls by the United Nations to respect the principle of precaution and distinction in their conduct of hostilities, this latest relentless campaign of air strikes by the government and its allies has continued to hit medical facilities, schools and other civilian infrastructure such as markets and bakeries. These are civilian objects and it seems highly unlikely, given the persistent pattern of such attacks, that they are all being hit by accident.<sup>22</sup>

In Yemen, CrisisInsight by ACAPS reported trends in January–May 2019:

The number of airstrikes reported countrywide continued to decrease every month until the end of April, while during the same period the number of airstrike-related casualties has been increasing. This shows that air-strikes more often target densely populated areas, causing mass casualties. Such airstrikes, reported in the capital city Sana'a or Mawiyah district of Taizz in May, often have a retaliatory character.<sup>23</sup>

Overall, while concrete examples of the effective adaptation of military policies and practices to mitigate civilian harm exist,<sup>24</sup> information exchange about good military policies and practices concerning explosive

---

<sup>19</sup> <https://www.genevacall.org/what-we-do/>.

<sup>20</sup> Tactical Directive, HQ ISAF, 6 July 2009. Available from

[https://www.nato.int/isaf/docu/official\\_texts/Tactical\\_Directive\\_090706.pdf](https://www.nato.int/isaf/docu/official_texts/Tactical_Directive_090706.pdf).

<sup>21</sup> Lowcock M, "Briefing to the Security Council on the humanitarian situation in Syria", 30 July 2019. Available from

<https://reliefweb.int/report/syrian-arab-republic/under-secretary-general-humanitarian-affairs-and-emergency-relief-94>.

<sup>22</sup> The 2019 Secretary General's report on protection of civilians in armed conflict provides additional examples of impact of explosive weapons on civilians and civilian objects when used in populated areas. For example, the report notes that the United Nations recorded more than 5,800 civilian casualties in 2018 resulting from improvised explosive devices, indirect fire and air-launched weapons. For more, see paragraph 31 of the report: <https://undocs.org/S/2019/373>.

<sup>23</sup> Yemen: Crisis Impact Overview (January–May 2019), CrisisInsight, 8 July 2019. Available from

<https://reliefweb.int/report/yemen/yemen-crisis-impact-overview-january-may-2019>.

<sup>24</sup> In 2017, the Office for the Coordination of Humanitarian Affairs (OCHA) published a compilation of military policy and practice on the use of explosive weapons in populated areas. Drawing primarily on the experience of two international military coalitions—ISAF and AMISOM—the compilation demonstrated how responsible and well-trained military actors strengthen protection of

weapons use in urban environments remains limited. As a result, such practices are applied inconsistently at the cost of increased civilian harm.

There is an opportunity for structured dialogue among States and military experts at international and regional levels on effective practices and their application in specific conflict contexts so that such practices can be shared, consolidated, and used more broadly in conflict. There is more that militaries might do to mitigate civilian harm.

## 1.8 ABOUT THIS RESEARCH

UNIDIR's research<sup>25</sup> seeks to (i) facilitate exchange of policies and practice among militaries working in specific or shared conflict environments in order to reduce harm to civilians from explosive weapons in urban and other concentrated areas; (ii) identify good practices from specific regional or country contexts that may have a mitigating effect in other conflict contexts or inform the development of operational practices to this end; and (iii) assess information and knowledge gaps on the impact of the use of explosive weapons use in urbanized environments. This research focuses on multilateral operations.

In August 2019, UNIDIR engaged with Major General (Retired) Roger Lane as a non-resident consultant to lead on this research. The research comprises the conduct of informal consultations with both military subject matter experts (SMEs) and selected IOs/NGOs that are engaged in this field, together with the ICRC. These consultations were complemented by a literature review and a questionnaire sent to contributors.

The output is this paper, which is designed to act as a catalyst for dialogue at an initial experts' workshop in Geneva in September 2019. Each section of this paper highlights key issues and offers a set of guiding questions for consideration. The paper provides examples of good practice drawing from experiences on multilateral operations. This paper is not exhaustive, nor does it preclude new material being put forward by workshop participants—the Research Team seeks to identify further military policy and practices from different contexts and environment at the upcoming experts' workshop. Some topics highlighted in one section may intersect with others.

The experts' workshop in September 2019 in Geneva will serve as an initial step to assess and identify gaps, challenges and opportunities to strengthen military policy and practice. The output of this workshop will inform the development of a preliminary Options Paper, aimed to initiate the identification of possible ways to improve military policy and practice to reduce risk to civilians and to further strengthen mitigation measures. Building on this initial research, UNIDIR, together with relevant partners, will further identify and consolidate good military practices and policies to mitigate civilian harm from explosive weapons use in urban environments at the subregional level through organizing two dialogue meeting among military forces in the Sahel and Horn of Africa regions in the first half of 2020.

Research undertaken under this Programme will help to inform ongoing efforts by States, IOs and NGOs to better protect civilians in urbanized arms conflict, including support to the implementation of Action 15 of the Secretary-General's Agenda for Disarmament and efforts led by the Office for Disarmament Affairs and OCHA to revise the compilation of good military policies and practices in reducing civilian harm from explosive weapons use.<sup>26</sup>

## 1.9 METHODOLOGY AND FRAMEWORK

This research frames the issue of explosive weapons in the broader context of protection of civilians and civilian harm mitigation. The approach adopted by the Research Team has been to look at the issue from an *Enterprise Risk* perspective—i.e. seeking to understand where the risks and uncertainties lie in the entire civilian harm mitigation 'life cycle'. This comprehensive life-cycle approach reflects care in civilian protection being taken at all points in the planning and use of military force and includes learning loops so that militaries can adapt and improve to overcome risks and challenges.

---

civilians by deliberately avoiding or limiting the use of explosive weapons in certain circumstances. See compilation here: <https://www.unocha.org/sites/unocha/files/OCHA%20Compilation%20of%20Military%20Policy%20and%20Practice%202017.pdf>.

<sup>25</sup> This work builds on existing policy research by UNIDIR. See for example, <http://unidir.org/files/publications/pdfs/ewipa-and-the-sdgs-en-651.pdf>; <http://unidir.org/files/publications/pdfs/reverberating-effects-research-agenda-en-653.pdf>; and <http://unidir.org/files/publications/pdfs/protecting-civilians-from-the-effects-of-explosive-weapons-en-293.pdf>.

<sup>26</sup> See <https://www.un.org/disarmament/sg-agenda/en/action/15>.

This life cycle includes two learning loops: operational learning, where assessments of causes and trends directly informs the improvement of operational practices and policies within the context of an ongoing operation; and institutional learning, where assessments of challenges and requirements inform needed changes to military capabilities. The framework covers seven specific areas of Doctrine<sup>27</sup> and Policy;<sup>28</sup> Organization, Training and Leadership;<sup>29</sup> and Equipment and Facilities.<sup>30</sup>

The paper focuses on five areas relevant to this life cycle, examining risks as well as opportunities under each area to enhance the effectiveness of military policies and practices in mitigating civilian harm from the effects of explosive weapons. They are:

1. planning and mandate formulation, to include resourcing capabilities;
2. intelligence;
3. target development and weaponeering;
4. target engagement; and
5. battle damage assessment and lessons identified.

This approach permits a broader number of options for potential implementation to be considered, while making it more relevant to different types of multilateral operations, such as those conducted by United Nations, the African Union, G5 Sahel, NATO or European Union, for example.

## **1.10 WORKING ASSUMPTIONS**

The working assumptions of this paper are:

1. The target audience are those armed forces who seek to comply with LOAC/IHL and international human rights law (IHRL) and not those who consistently and repeatedly violate their obligations.
2. Avoidance of the use of explosive weapons in urbanized environments requires choices in military strategy and capability<sup>31</sup> to be made available to a deployed force.
3. Conduct of operations in urbanized environments is often context specific. While there may be good practices that have widespread application in different multilateral operations, the variety of mandates and operational environments makes the adoption of some options more selective. Nonetheless, the exchange of good military policy and practices among States and their armed forces can help inform efforts to reduce risks to civilians and further strengthen mitigation measures.

## **1.11 LIMITATIONS**

This research activity specifically precludes consideration of space-based warfare and effects or those derived from offensive cyber operations in order to retain its focus on mitigating civilian harm from the effects of explosive weapons. This is not to underplay the potential effects of such activities, which merit separate study.

## **1.12 WORKING DEFINITIONS**

Consultations undertaken in the course of this research have identified a lack of commonality in definitions, which can lead to misunderstandings or misperceptions. Accepting the need to work for tighter definitions within the Community of Interest (CoI) and Community of Practice (CoP), the following are the working definitions for the purposes of this research.

### **1.12.1 Urbanized environment<sup>32</sup>**

Urbanized areas are those with a high density and number of people, living in a built-up area which features a blend of some or all of the following: residential, commercial, industrial, administrative, cultural, educational,

---

<sup>27</sup> Doctrine refers to written documentation, such as Allied Joint Publications or similar.

<sup>28</sup> Policy refers to issues such as Targeting Directives, Target Engagement Authorities or Collateral Damage Estimation methodology to be used. Policy will also include LOAC/IHL and IHRL.

<sup>29</sup> Leadership is more than just decision-making. It also includes creating the command climate where everybody's contribution is valued.

<sup>30</sup> Facilities refers to infrastructure available, from ammunition storage sites to training ranges for pre-deployment and maintenance of skills, for example.

<sup>31</sup> Capability in this context means equipment, choices of munitions, training etc.

<sup>32</sup> Working definition introduced by UNIDIR. This definition may be subject to change.

health and recreational spaces. Public services have high levels of interdependence, leading to enhanced vulnerabilities, and urbanized areas have a high concentration of local governance administrative structures.

In conflict zones, there may be high levels of destruction, disruption or cessation of services and governance, with large numbers of people seeking refuge and security, while combatants seek to dislodge, eject or defeat each other. Numbers may fluctuate greatly and quickly in response to local security conditions, lack of services or (un)controlled mass movement of displaced people.

#### **1.12.2 Accuracy**

The ability to hit a desired target.

#### **1.12.3 Civilian harm**

Civilian harm includes conflict-related death, physical and psychological injury, loss of property and livelihood, and interruption of access to essential services. (CIVIC)

#### **1.12.4 Civilian harm mitigation**

Civilian harm mitigation includes all measures taken by armed actors to prevent, minimize and address civilian harm resulting from their own operations. (CIVIC)

#### **1.12.5 Collateral damage**

The effect of inadvertent casualties and destruction in civilian areas caused by military operations. (NATO AAP-6)

#### **1.12.6 Explosive primary effects**

Destructive effects radiating from the point of initiation of detonating ordnance and, includes blast over-pressure, fragmentation, heat and light. (CEW)

#### **1.12.7 Explosive secondary effects**

Destructive, immediate additional effects to the primary explosive weapon effects due to the interaction with structures and substances present in built and natural environments. Examples are secondary fragmentation generated by blast or primary fragmentation, fires caused by thermal output, the generation of toxic gases and hazardous chemicals, smoke or debris, etc. (CEW)

#### **1.12.8 Explosive tertiary effects**

Indirect increase in the pattern of harm from the primary and secondary effects, manifesting in reduced safety and security, lack of health services, lost livelihoods, poor nutrition and hygiene, weakened governance and social services and rise of socio-economic problems. Examples are lack of food and water supply, dysfunction of sewage system and telephone lines, inability to access medical care and schooling, loss of livelihoods and unemployment, lack of basic security and other detrimental consequences on everyday activity. (CEW)

#### **1.12.9 Precision**

The ability to hit a desired target consistently. For indirect fire and air-delivered munitions, this is often enabled by technology.

## 2 Planning and Mandate Formulation

For those militaries that are under civilian control, there is an iterative dialogue between the political decision-making body and the prospective military headquarters that might be tasked with the conduct of an operation in order to define its mandate and the resources required to fulfil it. A key element of this dialogue is to match the proposed mandate with the risk appetite and tolerance of the Troop Contributing Countries (TCC) that will be exposed to risks and loss of life. Balancing the risk-to-force against the risk-to-mission is essential to avoid civilians from being exposed to more harm.

Working collaboratively, they work to understand the nature of the problem, develop military options with which to resolve the problem and begin planning. The political decision-making body will provide direction and guidance and authorize some of the products from the military headquarters to permit subsequent work, especially relating to targeting.

### Key issues in this section

- Understanding the nature of the problem
- Evolution of military campaigns
- Conduct of operations in urbanized environments
- Resourcing capabilities to match the mandate

## 2.1 UNDERSTANDING THE NATURE OF THE PROBLEM

### 2.1.1 Conceptual understanding

**If you don't understand the problem, almost any solution will suffice.** Understanding the nature of the problem is essential before considering any response options. This is elegantly described in General Sir Rupert Smith's *The Utility of Force*, in which he describes eight question-sets a commander needs to answer.<sup>33</sup> This requires the collection of open-source as well as classified information in order to develop a comprehensive understanding of the potential operating environment and desired outcome.

It also requires military planners to have a conceptual understanding of the problem and how they might approach it. Central to this is an understanding of the provisional end state that is desired by the political decision-making body. For example, in Libya in 2011, Security Council resolution 1973 (2011) authorized Member States to take "all necessary measures".<sup>34</sup> As part of its implementation, under Operation Unified Protector, the NATO political end state included the statement "measures ... to protect civilians and populated areas under threat of attack ... until the international efforts are no longer required".<sup>35</sup> **This leaves the Member States or implementing organization to decide what "all necessary measures" are, including the use of lethal force.**

In 2007, the African Union's Peace and Security Committee authorized the deployment of the African Union mission in Somalia (AMISOM). Part of its mission was to "create conducive conditions for long-term stabilization, reconstruction and development in Somalia".<sup>36</sup> By 2017, it was mandated to "Reduce the threat posed by Al-Shabaab and other armed opposition groups".<sup>37</sup> **Another question is raised: What does "reduce" mean in this context for a military commander and how might it be achieved?**

In 2012, the Security Council reaffirmed that "the protection of civilians must be given priority in decisions about the use of available capacity and resources and encourages further the use of innovative measures implemented by [United Nations Organization Stabilization Mission in the Democratic Republic of the Congo]

---

<sup>33</sup> Joint Defence Publication 2.00, Understanding and Intelligence Support to Joint Operations, Third Edition, Change 1, UK MOD, pp. 3–8. Available from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/311572/20110830\\_idp2\\_00\\_ed3\\_with\\_change1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/311572/20110830_idp2_00_ed3_with_change1.pdf).

<sup>34</sup> S/RES/1973 (2011). Available from [https://www.nato.int/nato\\_static/assets/pdf/pdf\\_2011\\_03/20110927\\_110311-UNSCR-1973.pdf](https://www.nato.int/nato_static/assets/pdf/pdf_2011_03/20110927_110311-UNSCR-1973.pdf).

<sup>35</sup> Interview with LTG Jodice, Air Commander, Operation Unified Protector.

<sup>36</sup> African Union Peace and Security Committee, 69th Meeting, PSC/PR/Comm (LXIX) dated 19 January 2007.

<sup>37</sup> S/RES/2372 (2017). Available from <https://www.un.org/press/en/2017/sc12972.doc.htm>.

in the protection of civilians”.<sup>38</sup> One of these measures to emerge was the Must-Should-Could (MSC) Matrix which was the result of a joint planning exercise between the Mission and the humanitarian community. The Matrix ranks key areas that are perceived to be as especially vulnerable to protection threats as being “must protect,” “should protect” and “could protect”.<sup>39</sup>

Protection of civilians (PoC) is a priority mandate and a core objective for United Nations peace operations. This includes peace operations’ specific mandate to protect civilians under Chapter VII of the Charter of the United Nations. The United Nations policy on PoC is guided by the 2015 Department of Peacekeeping Operations (DPKO) / Department of Field Support (DFS) Policy on Protection of Civilians in United Nations Peacekeeping,<sup>40</sup> and places PoC at the heart of the mission’s senior leadership’s political engagement and advocacy. Guidelines that supplement the implementation of this policy include 2015 Guidelines on Implementing Protection of Civilians Mandates by Military Components of United Nations Peacekeeping Operations,<sup>41</sup> and the 2017 Guidelines on the Deterrence and Use of Military Force in United Nations Peacekeeping Operations.<sup>42</sup> Applicability (and in some cases the challenges to implementation) of these key policy documents and guidelines for reducing civilian harm from explosive weapons are elaborated throughout the paper.

Current NATO conceptual thinking to strengthen its commitment to PoC is to augment its State-centric perspective with a population-centric perspective to better understand human security. NATO policy also recommends that it look at crises through three lenses: Mitigate Harm, Facilitate Access to Basic Needs, and Contribute to a Safe and Secure Environment. The objective is to change NATO’s mindset, for which it has an endorsed action plan that is being implemented. Separately, NATO has also considered the implications of working alongside local, national forces or other partner States in its thinking on PoC, which brings its own challenges, as articulated in section 2.5.1.

For the majority of United Nations peace operations that are serving under Chapter VII, the mandate is not so dissimilar to those of NATO operations, containing language such as ‘decides that it is authorized to take the necessary action ... in order to protect civilians’. The Policy on Protection of Civilians in United Nations Peacekeeping defines the PoC mandate for civilian, military and police components in United Nations peacekeeping as follows: “all necessary means, up to and including the use of deadly force, aimed at preventing or responding to threats of physical violence against civilians, within capabilities and areas of operations, and without prejudice to the responsibility of the host government”.<sup>43</sup> Differences between United Nations and NATO operations may be characterized by availability of capabilities, such as intelligence or the relative willingness to use force to achieve its objectives. There are some United Nations peacekeeping missions where indirect fire weapons have been deployed or that were supported by attack helicopters in a close combat attack (CCA) role. An example is the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA)<sup>44</sup> which provides a range of support to ground forces, including ‘show-of-force’ missions against armed groups attacking civilians, in which the threat of force, rather than the use of lethal force, is used to dissuade armed groups from pursuing their objectives.

### 2.1.2 Analytical tools

Various tools are employed by military planners to better understand the operational environment, such as the United Nations’ Analysis of the Operational Environment (AOE) or NATO’s Comprehensive Preparation of the Operational Environment (CPOE) processes, in order to understand the dynamics at play. As an example,

---

<sup>38</sup> S/RES/2053 (2012). Available from <https://monusco.unmissions.org/sites/default/files/n1239313.pdf>.

<sup>39</sup> See <https://monusco.unmissions.org/en/protection-civilians-and-protection-tools>.

<sup>40</sup> Currently under review. The respective Departments have been re-named to Department of Peace Operations and Department of Operational Support. For ease of reference, this Policy is hereafter referenced in this report as the United Nations Policy on Protection of Civilians in United Nations peacekeeping. Access the document here: <http://providingforpeacekeeping.org/wp-content/uploads/2017/08/2015-07-Policy-on-PoC-in-Peacekeeping-Operations.pdf>.

<sup>41</sup> Access here:

<http://dag.un.org/bitstream/handle/11176/89597/2015.02%20POCCGuidelinesforMilComp%20OMA%20Feb15%20Guidelines.pdf?sequence=19&isAllowed=y>.

<sup>42</sup> Access here: <https://info.publicintelligence.net/UN-PeacekeepingForces-2017.pdf>.

<sup>43</sup> See Section E, para 10, <http://providingforpeacekeeping.org/wp-content/uploads/2017/08/2015-07-Policy-on-PoC-in-Peacekeeping-Operations.pdf>.

<sup>44</sup> “The only female pilot to fly armed helicopters in MINUSMA”, UN Peacekeeping, 23 March 2018. Available from <https://peacekeeping.un.org/en/only-female-pilot-to-fly-armed-helicopters-minusma>.



one tool used for developing an understanding of an adversary is a Centre of Gravity Analysis,<sup>45</sup> which develops a systems analysis of capabilities, requirements and vulnerabilities. This is not a trivial matter and selecting what is the centre of gravity may have profound effects on the development of a plan. For example, Ian Bertram argues that the centre of gravity of ISIS is “derived from coherent and even learned interpretations” of competing ideologies.<sup>46</sup> Anthony Cordesman argues that the centre of gravity would be undermined by the Iraqis being able to bring the “Arab Shi’ite, Arab Sunnis and Kurds back together as some form of functioning state”.<sup>47</sup> David Kroll argues that the ISIS centre of gravity lies in its “ability to innovate”.<sup>48</sup> Whether it is ideology or its ability to innovate is moot: the question is how one perceives it to be and how that influences thinking. A strategy to counter innovation is unlikely to be the same one to counter the effects of an ideology.

Military planners may use other analytical tools as well, such as Systems-of-Systems Analysis (SOSA) to gain insights. This technique attempts to identify the critical aspects of an adversary’s systems and their interconnectedness. Targeteers, for example, might use Target Systems Analysis (TSA), working closely with intelligence staff to identify potential targets.

### 2.1.3 Multiple actors in a chaotic space

**Mitigating the effects of operations on the civilian population requires the military to have high-quality data and information, much of it from unclassified sources, including IOs/NGOs. However, data-sharing is a challenge.**

It is likely that non-military actors, such as humanitarian and development actors, have been in a country for some years or decades before a multilateral military force is deployed. There is also likely to be a plethora of NGOs pursuing their mandates. In some countries, there may also be United Nations country teams and agencies deployed in support of humanitarian and development objectives. All these actors have substantial political, social, economic, cultural, infrastructure and other sources of information to implement their strategies to support the civilian population that can help military planners understand the operating environment better.

Sharing information can sometimes be challenging and the issue is developed further in section 3.3. Notwithstanding, at all levels, sharing information can yield benefits. As an example, to deconflict humanitarian actors’ planning with that of the military coalition in Syria, planners exchanged views and identified roads and airfields that could be used by the former for their planning to support the relief of Mosul some months in advance of the actual operation.<sup>49</sup> However, military planners may not have adequately considered the second order effects on civilians of cordoning the city to entrap ISIS within, the concept being to isolate the ISIS defenders and cut their lines of communication into East Mosul. The result was an unprecedented level of planning for healthcare provision, led by the World Health Organization.

### 2.1.4 Proxy wars and NSAGs

**NSAGs are not homogeneous and need to be considered carefully.**

Many contemporary conflicts have NSAGs as parties to the conflict. These may be forces that were once loyal to a government becoming opposition forces; forces that fight alongside State forces; those that oppose the presence of foreign companies in the oil, gas and extraction industries; community self-defence militias or those that have other motivations. The acronym NSAG should not imply any homogeneity of the groups, nor should it imply that their motivations are necessarily bad, despite tendencies to dismiss armed groups’ views on humanitarian norms.<sup>50</sup> For military planners, NSAGs may become potential ‘partners’ with national, alliance or coalition forces, or they may become potential adversaries.

---

<sup>45</sup> Defined by NATO as “characteristics, capabilities or localities from which a nation, alliance, a military force or other grouping derives its freedom of action, physical strength or will to fight”. AAP-6, NATO.

<sup>46</sup> Bertram I, “Finding the ISIS Center of Gravity: why does it have to be so complicated?”, Small Wars Journal, undated. Available from <https://smallwarsjournal.com/jrn/art/finding-the-isis-center-of-gravity-why-does-it-have-to-be-so-complicated>.

<sup>47</sup> Cordesman A, “The Real Center of Gravity in the war against Islamic State”, CSIS, 30 September 2014. Available from <https://www.csis.org/analysis/real-center-gravity-war-against-islamic-state>.

<sup>48</sup> Kroll D, “How ISIS Endures by Innovating”, Foreign Affairs, 30 September 2016.

<sup>49</sup> Interview of civilian SME by author.

<sup>50</sup> Heffes E, “Armed Groups and the Protection of Health Care”, International Law Studies, vol. 9, 2019.

### 2.1.5 Are the armed actors likely to comply with LOAC/IHL?

**Applying pressure on non-compliant actors through the application of law could induce behavioural change.**

An early appreciation of the crisis might reveal the propensity of an armed actor to be compliant or non-compliant with LOAC/IHL. Where the assessment is that an armed actor is unlikely to be compliant and may intentionally target civilians, consideration needs to be given as to whether the military force will support the prosecution of war criminals through the provision of evidence as part of its mandate. In so doing, it must consider whether its own actions stand up to scrutiny. Naming war criminals, threatening prosecution and following-up with charges could induce behaviour change and mitigate civilian harm.

### 2.1.6 Cultural property protection

**States have obligations to protect cultural property while organizations like ISIS have weaponized it to coerce, intimidate or humiliate civilian communities. Threatened communities may use cultural property as sanctuaries, so understanding this landscape is important.**

A further challenge for military planners is to understand their responsibility under the protocols and regulations of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict.<sup>51</sup> This is especially the case where an armed actor may engage in the psychological coercion of a population by threatening cultural icons, such as in Mali, where the International Criminal Court prosecuted Ahmad al-Faqi al-Mahdi for intentional damage to nine mausoleums and a mosque in Timbuktu.<sup>52</sup> The attack on Yazidis by ISIS and their refuge on Mount Sinjar is also an example of seeking to humiliate ethnic groups, targeting cultural heritage sites.<sup>53</sup> ISIS have also repurposed cultural property, for example, for use in construction.<sup>54</sup> One by-product of this strategy has been the formation of militias with the explicit mandate of protecting cultural property.<sup>55</sup> Ensuring that cultural property is entered into targeting databases becomes a key task in planning to prevent accidental engagement, the challenges of which are explored further in section 3.3.5.

### 2.1.7 Target set development in planning

In proposing target categories and target sets, such as Military Leadership or Petroleum Infrastructure, planners must constantly ask themselves how the target sets facilitate the achievement of the objectives of the campaign, balanced against potential negative effects. While targeting petroleum storage capacity may undermine the military effectiveness of an adversary by making them less mobile, it may also have the unintended consequences of impeding local markets as fuel shortages disrupt the supply chain or degrading the capacity of the healthcare sector to run emergency power. By asking these questions, greater clarity is given to what represents **military necessity** and **advantage**, while gaining political approval removes some of the uncertainty as to what is and what is not acceptable. Decision makers may prohibit certain target sets or limit targeting of them on policy or legal grounds to specific situations or phases of an operation as a method of control and consideration of **proportionality** and **unnecessary suffering** obligations.

## 2.2 EVOLUTION OF MILITARY CAMPAIGNS

During planning, military staffs will develop scenarios or options available to an adversary and these are typically defined as Most Likely Course of Action (MLCOA) and Most Dangerous Course of Action (MDCOA) or variant of the same. Planning proceeds against these assumed Courses of Action, including capabilities required and ultimately Rules of Engagement (ROE). However, once a force deploys, the conflict becomes dynamic as each party to the conflict wrestles to gain or maintain the initiative. This implies the potential for unpredictable outcomes, unintended consequences, and the constant need to assess the situation and how to respond. End states are likely to be more unpredictable as a ‘cone of possibilities’ develops,

---

<sup>51</sup> 1954 Hague Convention for the Protection of Cultural Property in the event of Armed Conflict, UNESCO. Available from <http://www.unesco.org/new/en/culture/themes/armed-conflict-and-heritage/convention-and-protocols/1954-hague-convention/>.

<sup>52</sup> Werner E, “Can the International Criminal Court Help Protect Cultural Heritage?”, CSIS, Issue 13, Summer 2017.

<sup>53</sup> See for example, [https://www.ohchr.org/Documents/HRBodies/HRCouncil/CoISyria/A\\_HRC\\_32\\_CRP.2\\_en.pdf](https://www.ohchr.org/Documents/HRBodies/HRCouncil/CoISyria/A_HRC_32_CRP.2_en.pdf).

<sup>54</sup> Cunliffe E, Curini L, “ISIS and Heritage Destruction: A Sentiment Analysis”, Antiquity Publications Ltd, 2018.

<sup>55</sup> Isakhan B, “The Islamic State Attacks on Shia Holy Sites and the ‘Shrine Protection Narrative’: Threats to Sacred Space as a Mobilization Frame”, *Terrorism and Political Violence*, Routledge, 8 January 2018, DOI: 10.1080/09546553.2017.1398741.

dependent upon the interactions between the various actors. The way in which ISIS adapted to the terrain and the Coalition's tactics in Mosul is a good example of complex adaptive systems evolving.

Understanding the problem assists planning staffs in defining objectives, capabilities required, target categories and political appetite. For example, a State whose survival is at risk from an existential threat is likely to have a different appetite for risk than one that is involved peripherally. **This raises a question: Does planning adequately reflect the conflict dynamics and the implications for targeting policy, required capabilities and ROE, as well as expectations of end states and implications for the civilian population?**

### 2.3 CONDUCT OF OPERATIONS IN URBANIZED ENVIRONMENTS

**Deciding whether to create undefended localities is a political choice that can reduce civilian harm. Decisions to fight in urbanized environments should adequately consider obligations to tend to the civilian population.**

A decision as to whether a force will conduct military operations in urbanized environments is for political decision makers, both in terms of defensive and offensive operations. Article 59(1) of the 1977 Additional Protocol I to the Geneva Conventions prohibits the attack or bombardment of any undefended locality, unless it loses its undefended status. Although preceding this rule, both Paris and Vienna were not defended from siege in the Second World War, for example. Consequently, they did not suffer the same devastation as others, the political choice being not to defend them against an aggressor. Such considerations need to be debated between the political decision-making body and a military headquarters.

The Battle for Mosul in 2016–2017 is often cited as an example of the challenges<sup>56</sup> of fighting in urbanized environments.<sup>57</sup> ISIS for example:

constructed an elaborate series of defensive positions inside the city, fortifying buildings, blocking avenues of approach, creating obstacles, and constructing underground shelters and tunnels ... ISIS deepened its defences by using the civilian population as shields. ... ISIS fighters offered stiff resistance at the Great Mosque (al-Nuri) and much of the old City was destroyed after weeks of savage fighting ...<sup>58</sup>

Attacking an urbanized environment is not without its hazards: preliminary figures from the Pentagon indicate that more than 774 Iraqi soldiers were killed and 4,600 wounded,<sup>59</sup> while reports indicate that up to 800,000 civilians were trapped in West Mosul<sup>60</sup> and 900,000 were displaced.<sup>61</sup> Reports of civilian deaths vary from 2,521 recorded by the United Nations,<sup>62</sup> which cautioned difficulty in collating numbers; to 5,000+ by the US National Public Radio's own enquiries in the city's morgues;<sup>63</sup> to 9,000–11,000 reported by Amnesty International,<sup>64</sup> to 40,000 reported by The Independent.<sup>65</sup> While this highlights the difficulties of acquiring accurate data, the bigger point is that civilian suffering was immense. The Geneva Conventions and Additional Protocols state that in armed conflict scenarios all wounded and sick must receive timely medical care to the

---

<sup>56</sup> The Mosul Trauma Response—A case study, The John Hopkins Center for Humanitarian Research, February 2018.

<sup>57</sup> Arnold T, Fiore N, "Five Operational Lessons from the Battle for Mosul", Military Review, Army University Press, January–February 2019. Available from <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/Jan-Feb-2019/Arnold-Mosul/>.

<sup>58</sup> "What the Battle of Mosul Teaches the Force", The Mosul Study Group, no. 17-24 U, September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

<sup>59</sup> Michaels J, "Iraqi Forces in Mosul See Deadliest Urban Combat since World War II", USA Today, 29 March 2017. <https://www.usatoday.com/story/news/world/2017/03/29/united-states-mosul-ISIL-deadly-combat-world-war-ii/99787764/>.

<sup>60</sup> The Mosul Trauma Response—A case study, The John Hopkins Center for Humanitarian Research, February 2018. Available from [http://hopkinshumanitarianhealth.org/assets/documents/Mosul\\_Report\\_FINAL\\_Feb\\_14\\_2018.pdf](http://hopkinshumanitarianhealth.org/assets/documents/Mosul_Report_FINAL_Feb_14_2018.pdf).

<sup>61</sup> Policies and Practices to Protect Civilians: Lessons from ISF Operations against ISIS in Urban Areas, CIVIC.

<sup>62</sup> Arraf J, "More Civilians than ISIS Fighters are Believed Killed in Mosul Battle", NPR, 19 December 2017. Available from <https://www.npr.org/sections/parallels/2017/12/19/570483824/more-civilians-than-isis-fighters-are-believed-killed-in-mosul-battle?t=1564657061407>.

<sup>63</sup> Ibid.

<sup>64</sup> "Iraq: New Reports Place Mosul Civilian Death Toll at More than Ten Times the Official Estimates", Amnesty International, 20 December 2017. Available at <https://www.amnesty.org/en/latest/news/2017/12/iraq-new-reports-place-mosul-civilian-death-toll-at-more-than-ten-times-official-estimates/>.

<sup>65</sup> Cockburn P, "The Massacre of Mosul: 40000 Feared Dead in Battle to Take Back City from ISIS as Scale of Civilian Casualties Revealed", The Independent, 19 July 2017. Available from <https://www.independent.co.uk/news/world/middle-east/mosul-massacre-battle-isis-iraq-city-civilian-casualties-killed-deaths-fighting-forces-islamic-state-a7848781.html>.

extent possible and that the responsibility for collecting and caring for them lies with the party to the conflict that has them in its power.<sup>66</sup> The complexity of planning and managing such operations is articulated well in the Mosul Trauma Response Case Study<sup>67</sup> and the roles that the Humanitarian Coordinator, Iraqi Department of Health, Coalition, World Health Organization and other actors fulfilled. **This merits a reflection: Do military planners consider adequately their obligations to provide timely medical care?**

The challenges of conducting military operations in urbanized environments are further exacerbated by the complex web of interconnectedness that exists among public services and utilities. Besides the direct civilian toll of coalition airstrikes and Iraqi forces, the physical destruction of the city of Mosul was extensive, affecting health, transport and other sectors. This is well-articulated in separate research by UNIDIR, in which the implications of the reverberating effects of explosive weapons is linked to the broader Sustainable Development Goals.<sup>68</sup> It also highlights the importance of planning for recovery from a crisis, not only response to it, so that political decision makers frame and resource the mandate appropriately. Understanding secondary and tertiary effects will be addressed later in section 4.6.5. **When conducting an appreciation of the operating environment, do military planners have adequate access to expertise and the tools to assess the potential effects of their actions? Is there too much focus on individual targets, rather than on cumulative and operational level consequences?**

## 2.4 RESOURCING CAPABILITIES TO MATCH THE MANDATE

### 2.4.1 Military requirements

**Avoiding the use of explosive weapons in urbanized environments requires a military force to have choices—choices in doctrine, tactics, capabilities and timing, for example. Planning and resourcing a mission should reflect these requirements.**

It is not uncommon for a gap to exist between the military Statement of Requirement (SOR) and the provision of military capability by States. Some organizations seek to provide the ‘Minimum Military Requirement’ (MMR); notwithstanding, there can still be deficiencies as the force is deployed. As planners develop their understanding of the problem, and identify tasks and required capabilities, it is important that commanders’ have choices so that they can ensure that employment of force is **proportional**, delivers a **military advantage** that avoids **unnecessary suffering**, but still delivers the desired effect. For example, forces require intelligence capabilities to determine positive identification and avoid misidentification of civilians as combatants. They also require equipment needed for self-defence, and if they are ground forces, possibly capabilities need to warn civilians to avert escalation of force situations. For staff requirements, they must identify non-traditional military tasks, such as Civilian Casualty Tracking, Analysis and Reporting activity, and add these to the Statement of Requirement. Where there is a significant mismatch between projected provision of capabilities and the mandate, the military headquarters must ask itself whether the mandate is achievable or requires dialogue with the political decision-making body, leading to modification or acceptance of risk.

When providing the justification for capabilities, the military headquarters should ensure that the consequences of non-availability are understood. For example, the NATO decision not to put ‘boots on the ground’ (BOOG) in Operation Unified Protector in Libya in 2011 denied the commanders access to human intelligence; a means of gaining positive identification (PID) and discerning pattern of life (PoL) (see section 5.5); delivering lethal effects from ground-based weapon systems; a means of disseminating precautionary warnings; a means of investigating allegations of civilian harm; and on-the-ground verification to support battle damage assessments, for example.

---

<sup>66</sup> ICRC. War and International Humanitarian Law. <https://www.icrc.org/eng/war-and-law/overview-war-and-law.htm>.

<sup>67</sup> The Mosul Trauma Response—A case study, The John Hopkins Center for Humanitarian Research, February 2018.

<sup>68</sup> Wille C, “The Implications of the Reverberating Effects of Explosive Weapons Use in Populated Areas for Implementing the Sustainable Development Goals”, UNIDIR, 2016. Available from <http://www.unidir.org/files/publications/pdfs/ewipa-and-the-sdgs-en-651.pdf>.

## 2.5 PARTNERING CONSIDERATIONS AND NSAGS

### 2.5.1 Partnering considerations

Contemporary operations provide examples of where a Coalition has partnered with a local force, such as the Afghan National Army by NATO, the Somali National Army by AMISOM or the Iraqi Security Forces by the US-led Coalition, as a means of resourcing an operation.

Military planners considering the use of potential ‘by-with-through’<sup>69</sup> partners may focus on their potential strengths and not their potential disadvantages adequately—shifting perspectives of where their interests lie, whether the civilian population accepts them as legitimate, their ability to hold ground for stability purposes,<sup>70</sup> or the bigger question of motivation and its implications for a concurrent political strategy. The ICRC also argues that partner proliferation can prolong conflict through increasing the overall fighting power in a conflict.<sup>71</sup>

Careful analysis is required to determine what is needed to put a partner force into a complex operation and a ‘Train, Advise, Assist’ conceptual model may be insufficient. Planners must carefully consider their legal responsibilities and policy priorities, when contemplating the relationships with partners, before deciding the extent of the support to be offered, and how much time is required before partners can be deployed into the battlefield where they can meet their responsibilities.

For example, within the context of United Nations peace operations, the United Nations Human Rights Due Diligence Policy (HRDDP) must be respected, aimed at ensuring that the United Nations does not support non-United Nations forces responsible for committing grave human rights violations.<sup>72</sup> Two well documented cases applicable are: 1) in the Democratic Republic of the Congo, Security Council resolution 1906 (2009) specified that respect for IHL and IHRL by the Congolese armed forces should be a necessary precondition for receiving the Mission’s support; and 2) in Mali, Security Council resolution 2085 (2012) requested that the African-led International Support Mission in Mali (AFISMA) carry out its tasks in compliance with applicable IHL and IHRL, and requested that before the start of offensive operations, the African Union should report to the Security Council on specific benchmarks including training of AFISMA and the Malian defence and security forces on their obligations under IHRL and IHL.<sup>73</sup>

### 2.5.2 Obligations of States and NSAGs

In the context of this paper, thought also needs to be given to the obligations of a State contemplating the use of partners, which may include the international legal responsibility for the actions of their partners; controlling the unlawful conduct of an armed group or its members; and must do everything reasonably in their power to prevent and bring violations to an end.<sup>74</sup> In 1949, States agreed that non-State entities could not become party to the Geneva Conventions. However, “it is today accepted that Common Article 3 is binding on non-State armed groups, both as treaty and customary law”.<sup>75</sup>

### 2.5.3 Mechanisms for engaging with NSAGs

There have been instances where a ‘special agreement’ based on Common Article 3 of the Geneva Conventions has been brokered so that parties to the conflict regarded the scale of the conflict to be such that application of

---

<sup>69</sup> “By-through-with” is a military expression to explain the types of relationships one might have with a NSAG when conducting operations.

<sup>70</sup> Katz B, “Imperfect Proxies: The Pros and Perils of Partnering with Non-State Actors for Counter-Terrorism”, CSIS 29 January 2019. Available from <https://www.csis.org/analysis/imperfect-proxies-pros-and-perils-partnering-non-state-actors-ct>.

<sup>71</sup> Droege, C, Tuck D, “Fighting Together: Obligations and Opportunities in Partnered Warfare”, ICRC, 18 March 2017. Available from <https://blogs.icrc.org/law-and-policy/2017/03/28/fighting-together-obligations-opportunities-partnered-warfare/>.

<sup>72</sup> See here: <http://hrbaportal.org/wp-content/files/Inter-Agency-HRDDP-Guidance-Note-2015.pdf>.

<sup>73</sup> See para. 10, resolution 2085, <http://www.globalr2p.org/media/files/sres2085-on-mali.pdf>.

<sup>74</sup> Ibid.

<sup>75</sup> “Article 3: Conflicts not of an International Character”, ICRC. Available from [https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Comment.xsp?action=openDocument&documentId=59F6CDEA490736C1C1257F7D004BA0E C#\\_Toc465169864](https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Comment.xsp?action=openDocument&documentId=59F6CDEA490736C1C1257F7D004BA0E C#_Toc465169864).

some provisions of the Geneva Conventions would be extended to incorporate elements normally associated with international armed conflicts.<sup>76</sup>

Organizations, such as Geneva Call, have had success with NSAGs by negotiating Deeds of Commitment with 64 groups<sup>77</sup> covering four thematic areas: ban on use of anti-personnel mines; protection of children; prohibition of sexual violence in armed conflict and towards the elimination of gender discrimination; and protecting healthcare in armed conflict. In 2019, it negotiated the agreement of the Southern Transitional Council in Yemen, who signed three of the Deeds.<sup>78</sup> Understanding the motivations of NSAGs is critical for military planners in the context of PoC and mitigating civilian harm.

The ICRC also recognize that partnering can yield benefits, because improving training, accountability through after-action reviews and processes, and sharing best practices can reduce violations, thus contributing to PoC.<sup>79</sup>

**Example from MINUSMA of restricting the use of explosive weapons by NSAGs in Mali (This text is adapted from the 2018 UNIDIR publication, *The Changing Role of Conventional Arms Control in Preventing and Managing Violent Conflicts*, by Arthur Boutellis, p. 19)**

In 2014, MINUSMA briefly considered asking armed groups which were party to the peace process to surrender 122mm rockets. This was considered because such rockets are imprecise when used with single tube launchers, as was the practice amongst armed groups, and because MINUSMA's Weapons Intelligence Teams had noticed the frequent use of such rockets against its camps and in the making of IEDs [improvised explosive devices] targeted at its convoys. Similar proposals were floated for developing Geneva Call-type deeds of commitment with armed groups to demonstrate their goodwill in relations to mines and IED components, as well as unusable ordnances that can be used for IED construction, but for which armed groups have no weapons systems. These projects did not proceed at that time, due to worries about antagonizing armed groups and of not being able to enforce such measures.

In 2017, restrictions were eventually imposed on the armed groups that had signed the 2015 peace agreement, and splinter groups. This was done to limit clashes between them and with Government forces—i.e. ceasefire violations—but also to prevent potential abuses against civilian populations. These NSAGs were ordered to stop patrolling with heavy weapons and convoys of more than five vehicles without the authorization of MINUSMA. Such restrictions, however, proved difficult for the peacekeeping mission to enforce in practice, because of capability limitations and risk aversion, and also due to caveats from many of the United Nations troop contributing countries. The problem with setting up such red lines is that the moment NSAGs realize that they will not be enforced, the mission as a whole may potentially lose credibility. It remains to be seen whether the ongoing implementation of the recommendations from the 2017 Report on Improving Security of United Nations Peacekeepers by Lieutenant General (Retired) Carlos Alberto dos Santos Cruz will change these dynamics.

**Partnering raises a series of questions: Do militaries understand the opportunities and challenges presented by using partners? Is this reflected adequately in the planning processes so that political decision makers can make informed choices? Do militaries underestimate the resourcing requirements or overestimate their own as well as partners' capabilities? Is sufficient consideration given to the legal obligations applicable to partners? How can militaries monitor and ensure partners' compliance with IHL?**

---

<sup>76</sup> An example was the agreement between the factions to the conflict within the Republic of Bosnia and Herzegovina on 22 May 1992. "Improving Compliance with International Humanitarian Law", ICRC. Available from [https://www.icrc.org/en/doc/assets/files/other/improving\\_compliance\\_with\\_international\\_humanitarian\\_law.pdf](https://www.icrc.org/en/doc/assets/files/other/improving_compliance_with_international_humanitarian_law.pdf).

<sup>77</sup> <https://www.csis.org/analysis/imperfect-proxies-pros-and-perils-partnering-non-state-actors-ct>.

<sup>78</sup> "Yemen: The Supreme Commander of the Southern Transitional Council Signs 3 Deeds of Commitment with Geneva Call to Improve the Protection of Civilians During Armed Conflicts." Geneva Call, 2 July 2019. Available from <https://reliefweb.int/report/yemen/yemen-supreme-commander-southern-transitional-council-signs-3-deeds-commitment-geneva>.

<sup>79</sup> Droege, C, Tuck D, "Fighting Together: Obligations and Opportunities in Partnered Warfare", ICRC, 18 March 2017. Available from <https://blogs.icrc.org/law-and-policy/2017/03/28/fighting-together-obligations-opportunities-partnered-warfare/>.

## Guiding questions for section 2: Planning and mandate formulation

- Is there enough dialogue between political decision makers and military headquarters to ensure that the nature of the problem is understood by both parties?
- Is there a requirement for political decision-making bodies to receive more training and education in contemporary warfare so that they understand better the consequences of their actions?
- Is enough attention paid to recovery, rather than to response, during the formulation of the mandate so that the consequences of actions are properly understood?
- Do military planners have enough access to non-military experts to build a comprehensive understanding of the operating environment? How might this be improved?
- Do militaries understand their obligations to provide timely medical care to civilians?
- Do militaries have adequate doctrine for the conduct of contemporary operations in urbanized environments?
- Does military planning adequately consider the potential metamorphosis of an adversary to neutralize the advantages that the prospective force might have?
- Do policies like Minimum Military Requirement limit choices for commanders to decide how to conduct operations?
- Are the pre-deployment training requirements defined adequately during planning?
- Are the implications of partnering thoroughly explored? If not, what needs to be done? How might these implications for mandate formulation and planning be different for partnering with NSAGs and other entities?
- Is there too much emphasis on individual targets rather than on cumulative operational-level effects?

### 3 Intelligence

**Intelligence is the bed-rock on which all targeting options and decisions are subsequently made. This section provides a background on intelligence to inform sections 4, 5 and 6 and emphasizes the role of data-sharing to mitigate civilian harm resulting from effects of explosive weapons.**

Reliable, valid intelligence and information is central to mitigating civilian harm, especially in urbanized environments. The military intelligence cycle of Direction (specifying intelligence requirements), Collection, Processing (including analysis), Exploitation and Dissemination is the generic methodology used by many of the world's militaries to support the planning and execution of operations.<sup>80</sup> It is a continuous cycle that relies on each step to provide the desired output of reliable and accurate intelligence and is supported by a diverse and discrete set of Intelligence Sources and Agencies (SANDA).

The data collected by the individual intelligence sources and agencies is then fused by a dedicated analytical element to develop an 'understanding', where it will benefit from having experts from diverse backgrounds<sup>81</sup> with access to the traditional military intelligence disciplines.<sup>82</sup>

Intelligence disseminated to decision makers is often graded<sup>83</sup> to help them understand its accuracy and reliability. Grading intelligence enables decision makers to understand the level of risk they are taking and influences their targeting decisions.

The United Nations Department of Peace Operations (DPO) has invested heavily in the production of a Peace Keeping Intelligence Policy and Handbook and is currently working with Member States to train personnel in the effective implementation of the processes.<sup>84</sup>

#### Key issues: Intelligence

- Establishing intelligence collection capabilities and priorities
- Understanding the operational environment
- Data governance
- Developing the intelligence to support target development

#### 3.1 ESTABLISHING INTELLIGENCE COLLECTION CAPABILITIES AND PRIORITIES

Intelligence support to operations in urbanized environments from a targeting perspective is particularly challenging. The level of detail required in urban environments to minimize civilian casualties as well as collateral damage to structures will be a strain on many States' intelligence capabilities, especially to maintain current intelligence. It also requires effective means to disseminate the Common Operating Picture (COP) and intelligence products to users.

##### 3.1.1 Prioritize collection early

To generate accurate and reliable intelligence, the first requirement is to prioritize the collection effort in those areas that will provide the data/information. **First reflection of this section is: Does planning ensure sufficient time for intelligence to deliver products?**

##### 3.1.2 Intelligence updates in dynamic situations

Intelligence target databases require detailed, accurate information, often down to the address of individuals or the exact location of a certain function within a complex of buildings. Given the number of perceived

---

<sup>80</sup> The DPO cycle is Direction (including Requirements, Tasking and Decisions), Acquisition, Examination/Collation, Analysis and Dissemination.

<sup>81</sup> Military experts, behavioural economists, anthropologists, historians, governance, and experts in development, stabilization, infrastructure or law enforcement, for example. Functional experts, such as those with expertise in sexual and gender-based violence, trafficking in persons, etc. may also be required.

<sup>82</sup> Human Intelligence (HUMINT), Signals Intelligence (SIGINT), Electromagnetic Spectrum Intelligence (ELINT), Communications Intelligence (COMINT), Imagery Intelligence (IMINT), Acoustic Intelligence (ACINT), Geospatial Intelligence (GEOINT), Measurement and Signature Intelligence (MASINT) or Open-source Intelligence (OSINT).

<sup>83</sup> Typically, they may use A–F for accuracy and 1–6 for reliability, representing decreasing levels of accuracy and reliability.

<sup>84</sup> DPO response to UNIDIR questionnaire.



potential threats to many States and the nature of these threats (from State and non-State actors) and the potential methods of attack which can be employed, the resources required to generate and maintain accurate, detailed databases are significant. Even those States with a large technological intelligence capability struggle to maintain currency. Moreover, it is highly likely that once an operation starts, the adversary will adapt to thwart their opponent's advantages, requiring the intelligence staff to adapt quickly to meet the needs of the operational commanders.

### 3.1.3 Intelligence databases—challenges

Many intelligence-targeting databases are stored in classified silos and the intelligence only shared with a limited number of individuals for security reasons. Access to the database is only via certain communications information systems (CIS) or applications and is dependent on classification levels. Further, access is limited to the original owners of the data/information, which will not always be the same as those States needing the intelligence. The effect of these types of policies was highlighted in an AMISOM conference in which the Deputy Commander for Operations and Plans said: "If you look at all the cases where there has been a failure to stall or mitigate terrorist threats, it is because one entity kept information to themselves".<sup>85</sup> These policies limit the ability to maximize all resources to update the database and prevent non-military intelligence sources and agencies from contributing in an effective manner.

### 3.1.4 Appropriate sensor/source

Reliance on single sources of intelligence is rarely adequate. Imagery intelligence (IMINT) may be able to demonstrate capability, but it may not give adequate insights into intent or the will of an adversary to fight. Commanders need multiple sources of intelligence to improve understanding and decrease risk in order to minimize civilian harm.

One of the Cold War lessons made by militaries was the need for mobile weapon systems that can perform their function and then move quickly to an alternate location to avoid being struck by counter-battery (CB) fire.<sup>86</sup> When such weapon systems are deployed in urbanized environments, being able to track the systems requires substantial effort and magnifies the requirement to understand the potential impact on civilians and civilian infrastructure if struck. Good practice has included handing over targets from one aircraft to another to wait for the target to move to a location where there are lower collateral damage considerations. **The Research Team seeks to obtain more cases from different operations of such practice: What other techniques have been tried and deemed effective?**

## 3.2 COMPREHENSIVE UNDERSTANDING OF THE OPERATIONAL ENVIRONMENT

### 3.2.1 Military intelligence support to operations

**Reducing civilian harm requires investment by militaries to understand the operational environment better, as well as engagement with civilian actors/IOs/NGOs that may have detailed knowledge that could be helpful to avoid unintentional harm.**

Military intelligence support to operational headquarters situational understanding<sup>87</sup> should be provided in the planning stage of any operation. "Even by the hour of the day, operations physically changed the landscape, the population migrated, and the electromagnetic spectrum adjusted".<sup>88</sup> While military intelligence sources and agencies and Joint Intelligence Surveillance and Reconnaissance (JISR) assets can contribute significantly at this stage, the exploitation of non-military or non-traditional intelligence sources is often under-used.

---

<sup>85</sup> "Somalia's Security Actors Conclude Two-Day Intelligence and Information Sharing Meeting", AMISOM news, 26 March 2019. Available from <http://amisom-au.org/2019/03/somalias-security-actors-conclude-two-day-intelligence-and-information-sharing-meeting/>.

<sup>86</sup> When a weapon system is fired or a radar is activated and emits a signature, artillery or other weapon systems pick up the emissions and cue the weapon to strike the point of origin of the emission. This is counter-battery fire.

<sup>87</sup> Lovering T, "Odin's Ravens, from Situational Awareness to Situational Understanding". Situational Understanding is the term used to "equip a commander to make the best possible decisions in the circumstances they face, with the resources at his disposal. Predictive foresight is the heart of understanding." Available from [http://www.jwc.nato.int/images/stories/threeswords/NOV\\_SITAW.pdf](http://www.jwc.nato.int/images/stories/threeswords/NOV_SITAW.pdf).

<sup>88</sup> "What the Battle for Mosul Teaches the Force", Mosul Study Group, no. 17-24 U, September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

Developing a comprehensive understanding of the operational environment and maintaining situational understanding requires access to both classified and open-source intelligence (OSINT) and is a whole-of-headquarters activity. At the strategic level, States will use all government departments' data and resources to provide understanding for strategic decision makers. However, the expertise in a generic military headquarters may generally be insufficient in isolation, so mechanisms are required to engage with civilian actors with the requisite expertise. This implies that the military headquarters need to invest in more or different resources with the appropriate skillset—such as engaging more effectively with academia, industry and commercial utility providers as well as IOs/NGOs—to develop situational understanding. For example, the United Nations Policy on Protection of Civilians in United Nations peacekeeping states that in preventing violence by NSAGs, inter-communal violence, serious crimes, the United Nations Mission will “monitor and address vulnerabilities, including ... disseminating information on rights and potential risks (including mines, explosive remnants of war (ERW), and other explosive hazard risk education)”.<sup>89</sup> Although mandates and objectives may be very different, there should be some common ground around PoC and mitigating civilian harm, where there can be an exchange of information to develop situational understanding. The issue relating to data governance is covered more in detail in section 3.3.

### 3.2.2 Population-centric scenario development

**Taking a longer-term ‘operational’ view of activities and the possible scenarios that might unfold could help commanders to understand the impact of their targeting decisions in a broader context.**

The intensity of fighting, especially in urbanized areas, can induce a focus on the short term, and result in a failure to consider the medium-term consequences of actions. Given the dynamic nature of conflicts, military headquarters should consider including population-centric dimensions to their assessments from the outset of planning. Some military headquarters do this by having a series of rolling estimates, which portray potential risks and mitigation measures that need to be kept up-to-date. Regular review of these estimates helps to anticipate potential problems and provide time for considering different options for alleviation. In their CrisisInsight programme, ACAPS construct scenarios, projecting plausible outcomes over a 6–9-month period from a humanitarian perspective. An example is their scenario work on the population movement back to Syria, developed in September 2017.<sup>90</sup>

## 3.3 DATA GOVERNANCE

**If trust is the currency of IOs/NGOs, then data flows are its exchange rates. However, there are institutional and systemic barriers to effective data exchange, and the cumulative effect is that the civilian population and civilian actors may be at greater risk from military operations where the exchange rate is poor. The corollary is that the military need to be more open and to have greater continuity in civil–military coordination posts to facilitate exchange of information.**

Gathering information is a critical tool for reducing uncertainty and risk for military headquarters for the planning and conduct of operations, especially in urbanized environments where they must unravel the complex web of interconnectedness of service delivery to be in a better position to assess tertiary explosive effects and mitigate civilian harm, including to those who are engaged in humanitarian operations. However, data exchange is hampered by a variety of factors. These factors are presented in the subsections below.

### 3.3.1 Trust

Trust is the currency of humanitarians and is built up over time. Humanitarians often have a long-term presence in a conflict zone, which contrasts with those in the military who may rotate every 4–6 months. Some States have recognized this, such as the United States, which has one-year appointments in operations. The United Nations also adopts a 12-month rotation policy for its Troop Contributing Countries on peace operations, but if States elect to rotate at the end of 6 months, that is done at their expense.

People selected for civil–military coordination or interaction are often not in a career stream where they can develop expertise over time, but rather fulfil an appointment for 2–3 years before doing something else. Given

---

<sup>89</sup> See section E.3, The PoC Response Phase, <http://providingforpeacekeeping.org/wp-content/uploads/2017/08/2015-07-Policy-on-PoC-in-Peacekeeping-Operations.pdf>.

<sup>90</sup> Movement back to Syria: Scenarios, ACAPS, 19 September 2017. Available from [https://www.acaps.org/sites/acaps/files/products/files/20170919\\_movement\\_back\\_to\\_syria\\_scenarios.pdf](https://www.acaps.org/sites/acaps/files/products/files/20170919_movement_back_to_syria_scenarios.pdf).

the criticality of civil–military coordination/interaction, consideration could be given to developing career streams that are recognized as desirable—rigorous selection and development programmes to create highly competent personnel who are respected in their field, and culturally attuned to working with civilians.

The United Nations Military Performance Evaluation Task Force (MPET) is developing standards for PoC for all their missions, which specifies activities to be conducted with local communities, the incorporation of information into planning and assessment, as well as the identification of potential threats and vulnerabilities to the civilian population that may be shared.<sup>91</sup> **This leads the Research Team to ask: To what extent do relevant PoC standards include specific guidance on protecting civilians from the effects of explosive weapons?**

### 3.3.2 Purpose

Understanding the purpose of information exchange is also an element of trust. Language is critical: a humanitarian may describe an insecure environment by their capacity to maintain access and deliver programmes; a military force may define insecurity by the number of incidents in a given area. When seeking information, military forces should be clear as to the purpose of information exchange as there are concerns about the misuse of such information by third parties.

In some conflicts, OCHA has worked as the broker for information exchange between the military and humanitarian actors, creating guidelines, providing direction to its Civil–Military Coordination (CMCoord) Officers in its handbook.<sup>92</sup> These take time—nine months in Iraq and over two years in the Sudan.<sup>93</sup> The Iraqi Country Guidelines of 2015<sup>94</sup> specify what general information should be shared by both humanitarian and military actors, underpinned by the fundamental principles of ‘do no harm’, ‘distinction’ and ‘last resort’. **The Research Team seeks to understand if other organizations have drafted similar model information-exchange agreements.**

### 3.3.3 Data security

**Any actor that is willing to share information must be satisfied that its data must be secure and not susceptible to unauthorized disclosure so that confidence is enhanced, and unlawful exploitation minimized, thus resulting in the potential for mitigating civilian harm from effects of explosive weapons.**

Some organizations are hesitant to share information with third parties, citing security or operational security (OPSEC) concerns. For example, the United Nations Educational, Scientific and Cultural Organization is required to publish proposed sites for Special Protection for registration purposes, but participating States have up to 30 days to object and there is anecdotal evidence that cultural property protection lists have been used maliciously by third parties for targeting.

There are good practices of data exchange when framed in the context of PoC and mitigating civilian harm from explosive weapons. For example, as part of efforts to make communities more aware of the risks from unexploded ordnance (UXO) or abandoned explosive ordnance (AXO)—collectively termed explosive remnants of war—organizations involved in clearance, such as United Nations Mine Action Service, GICHD, Mines Advisory Group and HALO Trust among others, have pursued data collection and exchange on munitions that have been deployed and their nature in order to avoid harm to people.

Other examples include organizations agreeing to anonymize the data to facilitate exchange and avoid security concerns. This is the approach taken by Insecurity Insight<sup>95</sup> in their work to aggregate data from 29 agencies, which permits sharing of security and other information without jeopardizing the safety of staff. It is hard work and takes time.<sup>96</sup>

---

<sup>91</sup> Response to questionnaire from DPO.

<sup>92</sup> UN Civil-Military Coordination Field Handbook v1.0 101 Series.

<sup>93</sup> Interview with civilian SME by author.

<sup>94</sup> Iraq Country Specific Humanitarian Civil–Military Coordination Guidelines, 16 November 2015, UN HCT Iraq.

<sup>95</sup> [https://data.humdata.org/organization/insecurity-insight?sort=metadata\\_modified+desc](https://data.humdata.org/organization/insecurity-insight?sort=metadata_modified+desc).

<sup>96</sup> Phone interviews with Christina Wille, Director Insecurity Insight, and Lars Nissen, Director ACAPS.

### 3.3.4 Data quality and quantity

**Data required to deconflict targeting operations from that of humanitarian activity requires high quality, assured data.** This requires significant investment to ensure data quality and maintenance thereof and may be of lower priority compared to core activity needs and the military may overestimate what data and information exists. The consultations have highlighted the need for a clearer description of what data is needed by whom, for what purpose and in what format. **Some have argued for a minimum data-exchange requirement to make it easier to understand purpose and to reduce the management burden.**

There are well established quality assurance (QA) mechanisms for creation and maintenance of intelligence targeting databases. However, the implementation of any quality assurance system is time consuming and requires significant resources. While the time and adequate resources may be available prior to any operation taking place, once the operation starts, quality assurance processes will require additional resources to maintain the targeting tempo and ensure currency with the developing situation. Planning should reflect this.

**Without sufficient trained resources able to access current databases or current reporting, targeting intelligence may become suboptimal and inaccurate.** This may be made more difficult when an adversary uses camouflage and deception to confuse the other side. For example, there is evidence of the Houthis in Yemen creating decoys for deception purposes.<sup>97</sup>

### 3.3.5 Timely exchange of information relating to targeting

Humanitarian actors and others that do provide information to a military headquarters have an expectation that it is disseminated to the appropriate staffs in a timely fashion. The air strike on the Médecins Sans Frontières hospital in Kunduz on 3 October 2015 killed 42 people,<sup>98</sup> having been struck by 211 AC-130 gunship 105 mm rounds. The US investigation confirmed that the hospital was known to be on the No-Strike List (NSL), that it was a Protected Site, but that a combination of human, process and technical errors were responsible in what it says was an ‘accident’. During the strike, Médecins Sans Frontières made repeated attempts to halt the operation, but this information did not get to the aircrew manning the AC-130 during the engagement. Sixteen US personnel were sanctioned for their role in the operation<sup>99</sup> and the United States paid condolence money and funds to rebuild the hospital.

In some theatres, attempts have been made to provide the military with access to a United Nations-deployed system—Track24<sup>100</sup>—as a means of providing near-real-time information about humanitarian convoy moves. However, security concerns have prevented an unclassified Internet connection to be made within the Operations Centre (OPSCEN), posing challenges to use of such technological tool.<sup>101</sup> Other mechanisms may be explored to facilitate the near-real-time exchange of information. In Operation Unified Protector in Libya in 2011, over 3,200 humanitarian flights were deconflicted with NATO air forces, while 3,500 humanitarian road movements were deconflicted in a 7-month period too, minimizing risk to humanitarians and civilians. This was done by data exchanges between the humanitarian organizations and the Allied Movement Control Centre (AMCC), which relayed the information to the Joint Task Force. The Air Commander created his own Humanitarian Aid Movement Cell in the Air Operations Centre to monitor every movement and to ensure that such movements were deconflicted with targeting processes.<sup>102</sup> **The Research Team is interested to learn if it would be possible to develop similar model agreements.**

Another example of such cooperation includes information exchange pertaining to the protection of cultural property. Consultations reveal that there is currently limited compatible mechanism to export data sets of the locations of cultural property to targeting databases that are militarily useful.<sup>103</sup> For example, the US Department of Defence needs a format that relates to the datum centre point of a location, whereas a heritage database with geographic information system expertise would use polygons to describe the extent of protected

---

<sup>97</sup> Hughes D, “Houthi Forces Deploy Decoys to Counter Coalition Airpower”, ARES, 7 January 2019. Available from <https://armamentresearch.com/houthi-forces-deploy-decoys-to-counter-coalition-airpower/>.

<sup>98</sup> Kunduz Hospital Attack, 3 October 2015. Available from <https://www.msf.org/kunduz-hospital-attack-depth>.

<sup>99</sup> [https://www3.centcom.mil/FOIA\\_RR\\_Files/5\\_USC\\_552\(a\)\(2\)\(D\)Records/1\\_Airstrike\\_on\\_the\\_MSFT\\_Trauma\\_Center\\_in\\_Kunduz\\_Afghanistan\\_-\\_3\\_Oct\\_2015/00\\_CENTCOM\\_Summary\\_Memo.pdf](https://www3.centcom.mil/FOIA_RR_Files/5_USC_552(a)(2)(D)Records/1_Airstrike_on_the_MSFT_Trauma_Center_in_Kunduz_Afghanistan_-_3_Oct_2015/00_CENTCOM_Summary_Memo.pdf).

<sup>100</sup> <https://www.track24.com/products/>.

<sup>101</sup> Interview with civilian SME by author.

<sup>102</sup> Interview with LTG Ralph Jodice, the Air Commander for Operation Unified Protector.

<sup>103</sup> Phone interview with Dr Cunliffe on 1 August 2019.

site<sup>104</sup>—this complication was experienced between the US Agency for International Development and the US Department of Defense in Yemen. Moreover, Ministries of Defence may not have single points of access to which the Ministries of Culture can engage and there may also be no habitual engagement between the two ministries to facilitate the exchange of such data.

### 3.3.6 Data management support to target development

Good practice suggests that each target for nomination on a joint target list, as opposed to combat engagement or in self-defence, should have a folder into which all known intelligence is put. Each item of intelligence should have associated assessments of confidence in the intelligence. This structured process, which is tightly controlled, allows auditing, but also the assessment of the level of risk so that a decision maker understands what is being asked of them. All proposed targets should have a link to a military objective, this being one method of assessing military advantage and necessity, so intelligence must support this assessment requirement.

#### Guiding questions for section 3: Intelligence

- What are the specific key intelligence challenges and gaps when fighting in urbanized environments? How might these be mitigated?
- Do military headquarters have access to the right expertise? What is missing? How might gaps be filled?
- Are targets linked to objectives so that military necessity and advantage are established?
- How might information-sharing be improved? What are the priorities to mitigate civilian harm?
- Would reframing the requirement for data exchange between military and civilian actors be improved if focused on PoC?
- Do model draft information-sharing agreements exist for speedier implementation?
- To what extent are intelligence processes documented, followed and audited?
- Are standards set in policy for achieving PID and PoL?
- What is required to facilitate exchange of cultural property protection data from a targeting perspective?
- Is training for intelligence staff adequate? What is lacking?
- Are commanders and other decision makers trained in understanding intelligence risks?

---

<sup>104</sup> Even a polygon might need further segmentation to identify which specific building or artefact should be protected, rather than provide blanket protection.

## 4 Target Development and Weaponing

Target development is the process of examining potential target systems, individual targets, or elements of a target to determine the type and duration of targeting effort that must be exerted on each target to create the desired effect. To do this effectively, the object needs to be characterized, both in terms of its physical characteristics, such as location, appearance, electromagnetic signature and construction, as well as its functional characteristics, such as what it does and how it does it.

Within Capabilities Analysis, weaponing is the matching of specific weapons and tactics so that the desired effects are delivered with the minimum risk of collateral damage. While weaponing has been traditionally an activity related to air-launched munitions, it equally applies to maritime and ground-based weapon systems.

### Key issues

- Policy direction
- Reliability and accuracy of intelligence
- Maintaining currency of intelligence on the proposed target
- Understanding the target characteristics adequately
- Having choices on which munitions to employ
- Target vetting and collateral damage estimation
- Close combat challenges

### 4.1 POLICY DIRECTION

**Direction by political decision makers shapes what is acceptable and what is not from a targeting perspective to achieve the mission.**

A political decision-making body is responsible to approve the target sets and ROE, which should also specify the PID criteria to validate a target, as advised by a military body. This may be a combination of optical, human, electromagnetic or other sources of information, and the PID criteria should specify how many sources are required to constitute PID. Early ROE issued to AMISOM (2010) specified what constituted PID but did not specify how many sources were required.

ROE may be differentiated by geographical area, phase of an operation, by the authority given to different levels of command to conduct an operation, or the type of weapon and its use, for example. ROE permit political control of the use of force and thus form a key element for accountability purposes. The author's work with AMISOM in 2011 proposed different officers having Target Engagement Authority (TEA) for individual weapon systems.<sup>105</sup>

Targeting policy should also define what effects may be achieved on different target sets, ranging from non-lethal options, such as to 'influence', to varying levels of degradation, up to and including 'destruction'. Although instances where self-defence is claimed are not bound by ROE, decisions still need to be made within IHL. Over-reliance on self-defence to justify actions may be seen as an expedient approach from a military perspective, but it increases risks to civilians.

Targeting policy may also provide guidance on how to interpret '**proportionality**' and '**military necessity**', especially in the context of the secondary and tertiary effects of explosive weapons. This is addressed in section 4.6.5 of this paper. **The Research Team seeks to better understand the following: Do all missions have effective targeting directives that specify PID measures? Are ROE sufficiently differentiated for control purposes? Do they include graduated levels of authority for the employment of force?**

---

<sup>105</sup> For example, the Force Commander was the only person with the authority to decide to fire 107 mm recoilless rifles or 120 mm mortars. For the 82 mm mortars, either Battle Group Commanders or the Contingent Commanders had authority to fire, depending on the Probability of Incapacitation and the risk-estimated distances involved.

## 4.2 RELIABILITY AND ACCURACY OF INTELLIGENCE

**Quantifying the reliability and accuracy of intelligence is a key tool for managing risk and uncertainty. Reducing risk is a key element of targeting and weaponizing so that civilian harm is avoided and minimized.**

Section 3 emphasized the importance of grading the reliability and accuracy of information for targeting purposes. These provide a useful indicator as to where uncertainty and risk lies, so that the staff can take measures to improve the overall reliability and accuracy of intelligence for the commander, by tasking additional intelligence, surveillance, target acquisition and reconnaissance (ISTAR) assets, for example, or by allowing the commander to exercise their judgement and accept the risk.

The proximity of an adversary in an urbanized environment increases the challenges for targeteers as many traditional military ISTAR sources may be unavailable or unsuitable, placing a reliance upon non-traditional or non-military sources of intelligence, thus introducing a new risk that may be difficult to quantify. The potential behaviours of an armed actor defending an urbanized environment make the issue of **distinction** harder. Risk management, with the assignment of a risk owner, supports accountability and responsibility needs and acts as another tool for minimizing civilian harm. Further, the confidence level in the intelligence supports evaluation of **proportionality, military necessity, unnecessary suffering and distinction**.

## 4.3 MAINTAINING CURRENCY OF INTELLIGENCE ON A PROPOSED TARGET

**Maintaining the current status of a target in an urbanized environment requires substantial investment in ISTAR, with multiple sensors tasked for intelligence collection. Having confidence in the status of the target, which may be mobile, is an important factor for the military decision maker.**

To satisfy policy directives on PID and PoL, and to provide information that would enable an accurate strike, significant investment in ISTAR is required to minimize risk to civilians. There should be multiple sensors with different capabilities assigned to gain intelligence on a proposed target, in order to characterize it better. The requirement must be established during planning with the actors providing the resources. The challenges are reflected in the Mosul Study Group's report: "Operations in Mosul were imagery-centric, but this imagery was not consistent due to the variety of systems and data disparities (resolution, angle, time of day, refresh rate)".<sup>106</sup> Improvisation included taking screenshots to facilitate collaboration between different headquarters.

Targeteers are responsible for understanding the environment in which they are operating and the type of entities that are to be protected from the effects of targeting. Intelligence must also be collected on protected objects, especially hospitals and other medical facilities, and entered on the NSL. The NSL is an integral part of the targeting process, flagging up sites where no authority to strike exists, except in cases of self-defence or when the site has lost its protected status. Even so, judgement must always be exercised and the level of authority (rank or appointment) should be specified in Targeting Directives. As illustrated earlier, these safeguards regrettably did not work in the Kunduz case, nor in a number of cases in Yemen where hospitals were struck despite being on the NSL. **This raises a question: What more might be done to enhance confidence and reliability of targeting information, especially when there are no ground forces deployed?**

## 4.4 TARGETING CHOICES TO DELIVER EFFECTS

The starting point for targeteers should be an understanding of the desired effect and how that might be achieved most efficiently and effectively. Targeteers are responsible to constantly ask of themselves whether there are other options available that might deliver the same effect with less risk of civilian harm. During planning, targeteers need to identify the likely requirements for different munitions so that they have maximum flexibility to match weapons characteristics with the desired effect on the target, in order to use the munition with the minimum likelihood of collateral damage. For example, in United Nations peacekeeping operations, adherence to Articles 22, 23 and 25 of the Hague Convention restricts the use of certain weapons and munitions and this is reflected in ROE.

---

<sup>106</sup> "What the Battle for Mosul Teaches the Force", Mosul Study Group, no. 17-24 U, September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

Although this paper focuses on the effects on civilians of the use of explosive weapons in urbanized environments and does not address offensive cyber operations (OCO), technology developments in the use of electromagnetic spectrum tools, such as electronic warfare attack, may provide less collateral damage than conventional munitions, such as a Mk82 bomb. Where such choices are not available or are inadequate, military commanders will be guided by the principles of **proportionality, necessity, unnecessary suffering** and **distinction** to determine whether to strike, wait until the situation changes (i.e. tactical patience), consider other methods of achieving the objectives (i.e. tactical alternative), or not to take action.

For example, in the context of ISAF, tactical patience and consideration of tactical alternatives became part of the operational toolkit. In early AMISOM ROE, troops were required to take every reasonable effort to resolve a potential hostile confrontation by means other than the use of force. In the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo, the armed helicopter detachment may be tasked with show-of-force missions.

**The Research Team wishes to further learn the following from different missions: Is doctrine and training adequate for military decision makers to make informed choices? Should there be greater emphasis on developing less-than-lethal capabilities to provide more choice? Where should the priorities lie? Do we understand enough about the unintended consequences arising from the use of less-than-lethal options? How do we measure the results of their use?**

## **4.5 TARGET VETTING**

### **4.5.1 Target lists**

Before a target is assigned to a military organization to be struck by a joint asset, it will need to be scrutinized before being accepted onto a Joint Target List (JTL). Within NATO, there is a mature process, using the Joint Targeting System (JTS), that provides a strictly controlled method of processing and vetting targeting information. The process begins with target development and the proposed target being placed on a Target Nomination List (TNL) or a site is placed on the NSL or the Restricted Target List (RTL). This system is not used for direct combat engagements where a ground force commander is using organic artillery.

For lower-capacity military forces that do not have access to computer-assisted functional applications to support targeting, simplified processes using spreadsheets may be used, provided that controls are put in place to ensure strict control of access and editing rights. If the force has access to geographical information systems (GIS), then it may be possible to import these locations onto mapping to provide a visual prompt for NSL or Restricted Target List locations. **More research and exchange of good practices on the process of target lists is needed in non-NATO contexts.**

### **4.5.2 Vetting**

United Nations peacekeeping missions generally rely on the Head of the Military Component (HOMC) to give guidance and authority on target engagement, but there is no effects-based targeting, reflecting their different mandates in comparison to that of NATO operations.



### **Example of good practice on target vetting from NATO**

Within NATO, the proposed target is reviewed by a working group of experts, who scrutinize the proposal. The working group should have a blend of different SMEs, to include intelligence and targeting staff, a political adviser (POLAD), legal adviser (LEGAD), gender adviser (GENAD), strategic communications adviser (STRATCOMAD), culture adviser (CULAD), civil-military cooperation (CIMIC) personnel, engineers, information operations, psychological operations (PSYOPS), public affairs and representatives of those organizations with the capability to bring ordnance to bear on a target. This ensures that the widest consideration is given to considering different options, including non-lethal options, before a recommendation goes forward to a decision board, or whether further work is required.

To ensure the commander or decision maker has access to the best possible advice, they are responsible for creating a ‘command climate’ where SMEs are expected to give their expert opinions without fear of being professionally compromised, bullied or intimidated. Subsequently, the draft Joint Prioritized Target List (JPTL) is scrutinized by a decision board and targets are approved, rejected or sent back for further work. The chairperson of the targeting board will then sign the list as an approved document and this becomes the legally authorized target list for engagement. It should be kept as an official record.

For lower-capacity armed forces, the principles of vetting target lists might be incorporated into processes and include staff from different backgrounds to provide input to enhance the overall decision-making process to ensure that as many perspectives are offered before decisions are made. **The Research Team seeks to learn from operations in non-NATO contexts: How is target vetting undertaken and what can be strengthened within missions? Do commanders have access to the appropriate expertise to make informed decisions?**

## **4.6 COLLATERAL DAMAGE ESTIMATION**

### **4.6.1 Methodology**

To enable decisions to be made on whether to strike a target, a system of estimating collateral damage is required. The US Collateral Damage Estimation Methodology (CDEM) is typically used as good practice within NATO, while other States use their own national versions. Collateral damage estimation (CDE) provides a commander with a risk assessment. It combines both science and art and is designed to produce a conservative characterization of the risk of collateral damage. Such a system needs to be simple, repeatable and be sufficiently flexible so that it can be used in time-critical situations.

The methodology is only one input into the overall decision-making of a commander—intelligence, ROE, LOAC/IHL, risks to civilians and own forces, and strategic risk all play a part too. CDEM is not designed to deny a commander the inherent right of self-defence—rather such actions must still be proportionate and in line with IHL.

### **4.6.2 Tiered CDE approach**

CDEM is built around several mutually dependent, incremental CDE tiers that requires commanders to apply increasing levels of scrutiny to a target, based on risk analysis. Only at the top levels of the CDE tiers are civilian casualties predicted and appropriate measures taken. **This raises a question: Apart from the use of potential civilian casualty figures in CDE as a metric, should more emphasis be given to military necessity, proportionality and unnecessary suffering when making recommendations?**

The higher the potential CDE level, the more detailed analysis is undertaken and may result in more direction given as to how the target is to be engaged, such as the heading (compass bearing), so that in the event of a munition overshooting the target unintentionally, civilian harm may be reduced. On the ground, artillery may be ordered to fire particular patterns, such as circular, linear or converged, in order to minimize risk.

The CDE process allows the desired target effect to be matched to the capability of the delivery platform and the performance of the munition, against what is known about the target and its environs. Using a series of

calculations, tables and other performance data, the collateral effects radius (CER) is determined,<sup>107</sup> against which weaponeering mitigation measures are undertaken. This requires a sophisticated understanding of CDE and related processes.

**The Research Team has identified a need to better understand the following: How widespread among national militaries is the use of CDEM as described here? Are sufficient targeteers trained in the CDEM? Are certification and recertification requirements sufficient to ensure skill currency? Is training sufficiently attuned to the challenges of targeting in urbanized environments?**

#### 4.6.3 Limitations of tiered CDE approach

**The CDEM does not apply to munitions that are not designed to cause lethal effects, such as illumination, smoke, flares or other countermeasures.** Illumination and smoke rounds may contain an incendiary component, which could cause collateral damage by creating fire hazards. While such munitions are not primarily designed to set fire to objects and thus may not be subject to the Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons, their indirect effects need to be considered before their use is authorized. CDEM does not address the ‘known unknown’ risks discussed below in section 4.6.4.

#### 4.6.4 Known unknown risks in tiered CDE approach

CDEM does not consider five categories of potential errors that can be reasonably predicted:

- weapon malfunctions or unknown delivery errors;
- unexpected transient movement or presence of the civil population or civil objects within a target area;
- change to delivery tactics based on operator judgement at the time, including target misidentification;
- human and man–machine interface errors;<sup>108</sup> and
- secondary and tertiary effects.

#### 4.6.5 Reverberating effects of explosive weapons

While CDEM provides an estimate of effects from an aim point in the form of a radius, it does not reflect accurately the complex nature of urbanized environments, the effects of which some term “urban canyons”,<sup>109</sup> the notion that structures can channel and reflect the blast effects in constrained areas, while dissipating more quickly in open areas. Some military experts argue that CDEM does take into account the reverberating effects of explosive weapons, with the key concern being the ability to estimate the resistance of the structures offering protection to civilians from blast effects. Much has been written by IOs/NGOs on the subject, including by GICHD,<sup>110</sup> UNIDIR,<sup>111</sup> CIVIC and Article 36,<sup>112</sup> and the ICRC.<sup>113</sup> The latter claims that military commanders must also consider the “reverberating effects of the attack” as a test of “foreseeable” effects.<sup>114</sup> Foreseeable effects not only refer to the immediate structural damage but include the consequence of any physical infrastructure damage for essential services, such as water and electricity supply, transport, access to food, and healthcare and education.

**Very few States have the capacity for modelling complex environments for specific targets, as this takes supercomputing power, expertise, access to significant data sets and time, and is context- and target-specific.** Balancing the time it takes to generate a response against the tactical or operational situation is a

---

<sup>107</sup> The collateral effects radius is a radius representing the largest collateral damage hazard distance for a given munition or weapon considering pre-determined, acceptable collateral damage criteria defined at each level.

<sup>108</sup> An example is an Airbus 320 crash on 20 January 1992, in which the aircrew programmed a descent rate of -3.3, or 3.3%, but because the aircraft was in heading/vertical speed mode, the Flight Control Unit read a rate of 3,300 feet/min descent. Eight y-seven fatalities resulted. <https://aviation-safety.net/database/record.php?id=19920120-0>.

<sup>109</sup> “Damage to the Built Environment from the Use of Explosive Weapons”, Briefing Paper, Article 36, September 2013.

<sup>110</sup> “Explosive Weapons Effects, Final Report”, GICHD, February 2017.

<sup>111</sup> Wille C, “The Implications of the Reverberating Effects of Explosive Weapons in Populated Areas for Implementing the Sustainable Development Goals”, UNIDIR Resources, 2016.

<sup>112</sup> “Report on a Workshop Examining Military Policies and Practices on the Use of Explosive Weapons in Populated Areas”, Workshop Report, October 2018. Available from [https://civiliansinconflict.org/wp-content/uploads/2018/10/Report-on-EWIPA-policy-and-practice-workshop-2018\\_10.pdf](https://civiliansinconflict.org/wp-content/uploads/2018/10/Report-on-EWIPA-policy-and-practice-workshop-2018_10.pdf).

<sup>113</sup> Nohle E, Robinson I, “War in Cities: The ‘Reverberating Effects’ of Explosive Weapons”, ICRC blog, 2 March 2017. Available from <https://blogs.icrc.org/law-and-policy/2017/03/02/war-in-cities-the-reverberating-effects-of-explosive-weapons/>.

<sup>114</sup> Ibid.

tension that the decision maker will face. In Mosul, the processing and approving the engagement of deliberate targets took 6–8 weeks,<sup>115</sup> in order to avoid civilian casualties—clearly at odds with the tempo of ground operations.

The challenge of understanding potential tertiary effects is gaining enough reliable information to the level of accuracy needed to assess those effects. This is not limited to the physical impact on transport or infrastructure, for example, but also on issues such as how gender roles are redistributed as a consequence of conflict and how this might adversely affect women and children, or that attacks on hospitals may deny access to women for maternity services. Some military headquarters have ensured that they have strong engineer branches with functional experts in power, transportation, etc., who can provide insights and advice, but further work is required to understand ‘foreseeable’ risks better.

However, there is no agreed methodology, or key indicators or measures to assess what specific effects are most critical to capture. The University of Manchester has a research project in collaboration with the London School of Hygiene and Tropical Medicine, together with the John Hopkins Bloomberg School of Public Health,<sup>116</sup> seeking to understand the “nature, frequency, scale and impact of attacks on healthcare in conflict through improved data collection and analysis”.<sup>117</sup> However, this research is confined to healthcare: what about transport, power, communications, water and sanitation, or fuel, for example? In 2019 UNIDIR initiated a methodology study to examine these issues further. **The Research Team recognize the need for further research on this topic to provide better information with which military commanders may make decisions.**

#### 4.7 CLOSE COMBAT CHALLENGES

The CDEM is designed for operational-level deliberate and dynamic targeting. It is not designed for managing close combat scenarios, in which two or more parties to the conflict are engaged in highly dynamic and mobile combat. Ground force commanders and their staffs are therefore reliant on training their subordinate units to apply LOAC/IHL so that the core principles of **military necessity, avoidance of unnecessary suffering, proportionality** and **distinction** are upheld. This requires strong leadership and training opportunities to reinforce the learning, together with a choice of means with which to deliver the desired effects. In ground warfare, this may include alternatives to air strikes, such as the use of tanks or other direct fire weapons to reduce the potential for collateral damage. Where the use of attack helicopters is envisaged, there may be additional weapon choices from 20 mm cannon to Hellfire missiles or their equivalents. Typically, the use of attack helicopters in close combat attack (CCA) missions does not involve the use of the CDEM, but relies on training, procedural requirements to comply with orders, ROE, PID and authority levels to engage in order to comply with IHL. **This raises an important question: Is the current provision of training related to the use of explosive weapons in close combat scenarios adequate?**

Ground force commanders and their staffs are responsible to have access and to impose the NSL and RTL, but they can also impose other fire support coordination measures (FSCM) to reduce civilian casualties. These may include the nomination of No-Fire Areas (NFA),<sup>118</sup> Fire Support Coordination Lines (FSCL),<sup>119</sup> Restricted Fire Areas (RFA),<sup>120</sup> or Fire Coordination Areas (FCA).<sup>121</sup>

Section 2 provided a description of the inherent advantages utilized by ISIS in the defence of Mosul. Similarly, al-Shabaab created a network of trenches and tunnels in Mogadishu that allowed them to move insurgents quickly and mass in an unexpected location in order to dislocate AMISOM forces. The vertical dimension of urbanized environments gives an advantage to those who have the high ground as they can observe larger

---

<sup>115</sup> Ibid.

<sup>116</sup> Researching the Impact of Attacks on Healthcare (RIAH) project, University of Manchester, 2019. Available from <https://www.hcri.manchester.ac.uk/research/projects/riah/>.

<sup>117</sup> Ibid.

<sup>118</sup> An area into which no fires or the effects of fires are allowed except when the establishing headquarters approves fires (temporarily) within the No-Fire Area on a mission-by-mission basis, or when an enemy force engages a friendly force, the COM may engage the enemy to defend his force.

<sup>119</sup> A line short of which all fires must be coordinated by the ground force commander. Abbreviated definition, NATO AAP -6.

<sup>120</sup> An area in which specific restrictions are imposed and in which fires that exceed those restrictions are not delivered without coordination with the establishing headquarters. NATO AAP-6.

<sup>121</sup> An area with specific restraints into which fires in excess of those restraints will not be delivered without approval of the authority establishing the restraints. NATO AAP-6.

tracts of land and call for fire. The structures of urbanized environments provide significant protection from weapon effects, reducing reliance on the need for defence stores, and there is much infrastructure that defenders can turn to their advantage. Further, by mingling with the civilian population, potentially using civilians as human shields illegally, defenders may be afforded some protection resulting from the restraint shown by the other party. Superimposed on this is that an armed actor may not be wearing a distinctive uniform, especially NSAGs, making recognition more difficult. This is compounded by a congested electromagnetic spectrum and the mobility of modern weapon systems that makes maintenance of PID a challenge. Collectively, these challenges make **distinction** more challenging and oblige commanders to consider the effects on the civilian population more closely when an armed actor occupies locations in proximity to civilians.

#### **Guiding questions for section 4: Target development and weaponeering**

- What intelligence capability is required to maintain accurate PID/PoL? How might this be compromised in a contested environment? What about when there are no 'boots on the ground'? What are the implications and risks?
- How might non-traditional sources of intelligence be brought into the targeting process to protect civilian objects from unintentional attack?
- How might misidentification of a target be minimized?
- How might the target vetting process be strengthened?
- Does planning adequately reflect the requirement to give the commander as much freedom of action as possible by providing them with a choice of weapon systems?
- Is there an effective CDEM in place? How might processes be improved? How might understanding of the reverberating effects of explosive weapons be improved?
- Is there a process in place that provides for different levels of Target Engagement Authority, commensurate with the level of risk associated with a target?
- Is there enough expertise to provide assessments of tertiary effects?
- What are the key aspects a commander must know about tertiary effects?
- Should information from non-intelligence sources have a grading system so that the decision maker understands the level of confidence and reliability in the information?
- Are there sufficient trained targeteers? Are there standards for certification? How often should they recertify?
- Is training sufficiently sophisticated to ensure that civilian harm is minimized?
- Do we make full use of lessons identified from real operations to expose commanders and staff to the challenges?
- Is there enough doctrine and training to support ground forces in close combat missions in urbanized environments?

## 5 Target Engagement

Target engagement is the physical act of sending a munition or projectile to its intended target. For indirect fire, this can be achieved by aircraft, attack helicopter, UAV, artillery (tube or rocket), or mortars and acceptance of a fire mission or task by States from headquarters will reflect their own weapon capabilities and predicted weapon effects, together with compliance with PID/PoL and collateral damage criteria.

For air-delivered weapons, the CDE and weaponizing process provides mitigation, especially in the delivery of stand-off weapons (SOW). However, ‘the pilot owns the bomb’, meaning that the final decision whether to release an air-delivered munition lies in the cockpit. The same is true for armed UAVs that have a remote pilot.<sup>122</sup> A pilot is simultaneously seeking to fly the aircraft safely, deconflicting with other air users and avoiding incoming fire, looking at their sensor systems tracking the target to maintain PID, and setting up their weapon systems properly so to deliver the desired effect. With many single-seat aircraft in service, the cockpit loading on the pilot is significant.

For ground forces, the challenges lie with the management of the whole system, from ammunition, weapon and mechanisms, to observing fire.

### Key issues: Target engagement

- Predeployment training
- Precautionary warnings
- Management of ammunition
- Artillery ballistic computations
- Confirmation and maintenance of PID
- Artillery adjustment of fire
- Recording munition expenditure

### 5.1 PREDEPLOYMENT TRAINING

Predeployment training is a vital component for mitigating civilian harm, especially in urbanized environments. Training should provide as realistic conditions as possible so that the full spectrum of dilemmas a military organization will face are practiced in a safe environment. Training often includes:

- LOAC/IHL/ROE;
- use of alternative tactics, including (de)escalation of force measures, ways of developing tactical patience;
- integration of air–ground teams;
- headquarters staff target development and weaponizing;
- cultural awareness;
- target clearance and authorization processes;
- civilian casualty mitigation processes;
- generating a common operating picture;
- integrating open-source intelligence into battle planning; and
- interacting with those humanitarian actors willing to engage with the military, while identifying those who are not.

Where partner or coalition forces are working alongside another military force, good practice is to develop a programme that facilitates joint integration.

---

<sup>122</sup> UNIDIR research has identified specific safety- and reliability-related issues associated with armed UAVs, which need to be taken into account in mission planning. An example of target misidentification in Afghanistan was by US armed UAV operations, because of the “actions of an individual or group may be misinterpreted as those of a combatant, or individuals in close proximity to known combatants may be mistakenly identified as an armed group”. This phenomenon was also seen for other air platforms as well as ground forces. See Woodhams G, Borrie J, “Armed UAVs in Conflict Escalation and Inter-State Crisis”. Available from <http://unidir.org/files/publications/pdfs/armed-uav-in-conflict-escalation-and-inter-state-crisis-en-747.pdf>.

The culmination of training should capture targeting requirements and restrictions to allow for weapons effects to be fully understood. Ideally, training should also include air–ground integration serials. In some States, live training is frequently substituted by simulation or table-top exercises, but these rarely replicate the true operating environment, where the cumulative effects of all the different elements of the targeting process and impacts on the civilian population are rehearsed. Whatever form training takes, it should include scenarios that require **distinction, proportionality, necessity** and **unnecessary suffering** principles to be practiced.

The United Nations conducts an operational performance evaluation of deployed contingents twice during a 12-month deployment, with a new Unit Performance Evaluation Report (UPER) to be rolled out at the end of 2019, to complement the Pre-Deployment Visit (PDV), which assesses and validates the readiness of contingents to deploy. **The Research Team is interested to identify what further lessons can be learned from the United Nations, African Union and other missions in terms of improvements to be made in predeployment training pertaining to reducing civilian harm from use of explosive weapons.**

## 5.2 MANAGEMENT OF AMMUNITION

**Safe and secure ammunition management is a key element in reducing unintended effects from munitions that result in more civilian harm, including during operations.** Ammunition performance is dictated by the design specification, quality assurance processes, management through the supply chain, and selection of appropriate fuzes, matched to an appropriate delivery system.

### 5.2.1 Ammunition management and relevance to protection of civilians

The General Assembly requested the United Nations to develop guidelines for adequate ammunition management. In response, the International Ammunition Technical Guidelines (IATG) were developed in 2011 and the United Nations SaferGuard Programme was established as the corresponding knowledge management platform.<sup>123</sup>

In those multilateral operations where capacity is low, there are several factors that can undermine performance,<sup>124</sup> which may lead to civilian harm:

- Security of the ammunition—Where host governments may have little capacity to ensure that ammunition is secure, these stocks may be at risk of diversion to NSAGs or other groups for their own purposes, including for the fabrication of improvised explosive devices (IED).
- Environmental and climatic conditions—Ammunition that is stored outside its design specification may not perform as intended.
- In those multilateral operations where donors provide ammunition (as gifts/grants for example), there is increased likelihood for ammunition to come from different sources, or different batches or lots, resulting in disparities in consistency and tolerance.

Where States have access to precision munitions, thought needs to be given to their prioritization, especially where there is an imbalance between supply and demand. Some forces allocate these high-value munitions for specific operations or phases of an operation to conserve them for high-priority targeting purposes.

### 5.2.2 Ammunition management in United Nations missions

The United Nations does not procure ammunition on behalf of its missions. Provision of ammunition is the responsibility of the Troop Contributing Countries. However, a field mission is required to establish a Weapon and Ammunition Advisory Board in accordance with United Nations policy on weapons and ammunition management.<sup>125</sup> The Board is responsible for ensuring that critical ammunition safety matters are addressed. The policy also provides guidance on storage, shelf-life, ammunition handling, inspection and repatriation too. The need for safe and secure management of weapons and ammunition is also recognized in the United Nations

---

<sup>123</sup> See Office for Disarmament Affairs, <https://www.un.org/disarmament/un-safeguard/>.

<sup>124</sup> More information regarding ammunition management in low-capacity and conflict-affected settings can be found in UNIDIR's publication: "Utilizing the International Ammunition Technical Guidelines in Conflict-affected and Low-capacity Environments", UNIDIR 2019.

<sup>125</sup> DPO/005/DPPA/DSS Policy on Weapons and Ammunition Management. Available from [http://dag.un.org/bitstream/handle/11176/400906/Weapons and Ammunition Policy.pdf](http://dag.un.org/bitstream/handle/11176/400906/Weapons%20and%20Ammunition%20Policy.pdf).

Policy on the Protection of Civilians in United Nations peacekeeping.<sup>126</sup> **The Research Team seeks to better understand the practices by United Nations missions to manage conventional ammunition: Do all United Nations missions have adequate mechanisms in place to ensure proper ammunition management? Does this include surveys of host nation ammunition facilities to ensure that the risk of unplanned explosions and unauthorized access to munitions by NSAGs is mitigated and minimized?**

### 5.3 PRECAUTIONARY WARNINGS

Additional Protocol I to the Geneva Conventions of 1949 requires: “Effective advance warning shall be given of attacks which may affect the civilian population, unless circumstances do not permit”.<sup>127</sup> The ‘feasibility’ test is also applied to determining whether adequate measures are taken to avoid striking civilians or civilian objects as well as the means and methods of attacks with a view to “avoiding, and in any event to minimizing, incidental loss of civilian life”.<sup>128</sup> Both attackers and defenders have responsibilities, with the latter responsible for precautions against the effects of attack.

Providing precautionary warnings is balanced by the need to preserve operational security to gain a military advantage in order to reduce the risk to own forces, while being mindful of the strategic and operational risks that accidental civilian casualties would cause in terms of political and public support.

In Operation Unified Protector in Libya in 2011, leaflets were dropped telling the local population to avoid being close to specific features, such as communications towers, or informing them that military action was likely to be seen in specific areas and advising them to leave. This is an example of operational-level precautionary warnings. A total of nine million leaflets were dropped for all purposes; however, this would not have been possible in contested airspace. In Mosul, leaflet drops to the civilian population was high risk—anybody attempting to pick a leaflet up could be hit by an ISIS sniper.<sup>129</sup>

Other tools may include using a civil emergency system for notifying the civil population, radio broadcasts and other psychological operations tools. If there are troops or special forces on the ground, there may be methods of notifying the civil population through third parties. In Gaza, there is documented evidence of an Israeli policy of phoning the occupants of a building that was about to be struck, instructing them to evacuate, this being an example of a tactical warning.<sup>130</sup>

However, in determining how to engage with the civil population to provide precautionary warning, military commanders need to be mindful of how such information can be used by an adversary. For example, one interviewee stated that there were cases where al-Shabaab in Somalia had attacked civilians who had been warned of an attack because they were deemed ‘collaborators’ of AMISOM or the Somali National Army. Some armed actors seek to control the mobile communications network, effectively switching “on” and “off” parts of the network, so that an attacker using mobile phone technology to inform the population may not be successful, or worse, the civilian population could be fooled into moving into an area where an attack was planned by the other party. **The Research Team recognizes a need for further research to identify what other methods of precautionary warnings might be considered and used in multilateral operations.**

### 5.4 ARTILLERY BALLISTIC COMPUTATIONS

The purpose of artillery is to provide area effects and thus weapon-matching to a target should necessarily reflect this. The accuracy of artillery is achieved by managing two levels of ballistics: internal (within the gun) and external (what happens to the projectile in flight). Internal ballistics covers the standard/quality of the projectile, the charge and the delivery system. The better they are each maintained, the more accurate the delivery of the projectile. Monitoring of potential variables is essential: barrel wear causes ‘windage’ resulting in errors in range, accuracy and precision; the collection of charge temperatures and muzzle velocity will

---

<sup>126</sup> See E.3, the PoC Response Phase, <http://providingforpeacekeeping.org/wp-content/uploads/2017/08/2015-07-Policy-on-PoC-in-Peacekeeping-Operations.pdf>.

<sup>127</sup> Article 57(2)(c) of Additional Protocol I to the Geneva Conventions, ICRC.

<sup>128</sup> Article 57 of Additional Protocol I to the Geneva Conventions, ICRC.

<sup>129</sup> “What the Battle for Mosul Teaches the Force”, Mosul Study Group, no. 17-24, U September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

<sup>130</sup> Erlanger S, Akram F, “Israel Warns Gaza Targets by Phone and Leaflet” The New York Times, 8 July 2014. Available from <http://www.nytimes.com/2014/07/09/world/middleeast/by-phone-andleaflet-israeli-attackers-warn-gazans.html>.

produce more accurate computational data. This is enhanced by using calibration data for each gun that is unique to the specific gun and barrel. However, the external ballistics are likely to have a greater impact on the overall accuracy of an artillery projectile. Factors influencing the trajectory of a projectile from the time it leaves the barrel to the time it impacts, include atmospheric pressures, winds and temperatures, rotation of the Earth, as well as the weight and density of the projectile.

Lower-capacity military organizations may struggle to maintain weapons to the recognized standard to mitigate these sources of variation. Similarly, they may not have access to ballistic computational data, including ballistic meteorological (BMET) data, increasing the risk of errors, possibly resulting in unintended harm to civilians.

## **5.5 CONFIRMATION AND MAINTENANCE OF PID AND POL**

### **5.5.1 Challenge of maintaining PID**

Operations in Iraq and Afghanistan where the air environment has not been contested has created a false impression among observers and militaries about the availability and capacity of ISTAR to find and then track a target to provide PID. When the air environment is contested, military commanders will need to consider the risk to scarce air-breathing ISTAR platforms when deciding what capabilities are needed to confirm PID.

Maintaining PID in an urbanized environment is challenging, especially when an adversary is using camouflage and deception or simple obscuration drills, such as when al-Shabaab burned tyres to create dense smoke to obscure their movement in Mogadishu. Children in Aleppo were reported to have burned tyres in 2016 to create an impromptu ‘no-fly zone’ above them, hoping to impede visibility.<sup>131</sup> An aircraft that has fixed a target may temporarily lose it as a pilot takes evasive manoeuvres or the sensor may be temporarily ‘blinded’ as the aircraft turns. There is therefore a risk that reacquiring the target results in misidentification of the target.

### **5.5.2 Misidentification**

Two principal causes of civilian casualties arise from:

collateral damage from an engagement with known enemy forces, where the effects of the engagement also impact nearby civilians; the second is through misidentification, where civilians are mistakenly believed to be enemy and are engaged because of that belief.<sup>132</sup>

Artillery counter-battery fire to neutralize an attack was an issue for Coalition forces in Iraq, since the mobility of ISIS weapon systems and their deployment among the civilian population put the latter at risk. The US report states that misidentification was often linked to self-defence where PID was based on “perceived hostile intent” and recommended several changes to tactics, techniques and procedures (TTP) to reduce misidentification, with a special reference to better understanding what should constitute ‘hostile intent’.<sup>133</sup>

### **5.5.3 PoL confirmation**

PoL techniques are employed during the target development process to better understand the behaviour of the target, to determine whether there are optimal ways in which to strike it, while minimizing collateral damage. A key principle espoused by Lieutenant-General Scaparotti, Commander of ISAF Joint Command (IJC), for the prevention of civilian casualties was to learn what is ‘normal’: “Behaviour that was inexplicable to US forces can be normal for Afghans”.<sup>134</sup> By engaging with local partners or those with detailed knowledge of cultural norms, it is possible to contribute to the mitigation of civilian harm.

---

<sup>131</sup> Evans P, Sini R, “Syrian Children Burn Tyres to Create No-Fly Zone”, BBC News, 1 August 2016. Available from <https://www.bbc.co.uk/news/world-36944470>.

<sup>132</sup> Lewis L, “Reducing and Mitigating Civilian Casualties: Enduring Lessons”, JCOA, 12 April 2013. Available from <https://info.publicintelligence.net/JCOA-ReducingCIVCAS.pdf>.

<sup>133</sup> Ibid.

<sup>134</sup> “Afghanistan Civilian Casualty Prevention”, US Center for Army Lessons Learned, no. 12-16, June 2012.



#### 5.5.4 Policy direction: “Presence of civilians is assumed”

The Commander International Security Assistance Force (COMISAF) tactical guidance of 2011 made it clear that “We must assume that civilians are present unless we can establish otherwise”.<sup>135</sup> In some incidents, the air–ground team assumed there were ‘no civilians present’, a consequence of observing the “outside of a building for minutes or even hours and not seeing activity”.<sup>136</sup> The effect of inverting the guidance by military units removes a safeguard for civilians. In urbanized environments, implementing such a policy is extremely challenging and more so when there are few or none of one’s own troops on the ground. Investing more heavily in ISTAR and PoL efforts may yield results, as may liaison with local partner forces, which are likely to have a better cultural understanding of what is ‘normal’ or not. **These experiences and lessons raise a few questions: What more needs to be done to strengthen tactical directives to ensure that guidance is not inverted? How might confidence in PID/PoL be strengthened to avoid misidentification, especially when there are no or few ‘boots on the ground’?**

#### 5.5.5 Improving ways of protecting healthcare sites in conflict

CNA<sup>137</sup> research into specific incidents in Yemen identified three practical steps for more effective protection of healthcare sites in conflict-affected areas. These included deconfliction measures to improve discrimination, improving military identification of medical facilities, and promoting best practices for civilian harm mitigation.<sup>138</sup>

#### 5.5.6 Network approach to avoid misidentification

Evidence from Afghanistan indicates that while deliberate strikes did contribute to civilian casualties, the majority of air-to-ground-induced civilian casualties arose from close air support (CAS) or close combat attack missions,<sup>139</sup> which are generally in direct support of a ground force commander. In urbanized environments, this is especially important as the ground force commander may have a very limited field-of-view and therefore not be in an effective position to gauge secondary or tertiary effects.

Without regular training and education, military personnel from one service might not appreciate the importance of passing to another service information that could affect decisions to fire or not. There is evidence in Afghanistan whereby the failure to pass important information resulted in civilian casualties.<sup>140</sup>

One method of improving how to avoid misidentification and unintentional collateral damage is to network the intelligence staff, targeteers, crews of the delivery platform, and any Joint Tactical Air Controllers (JTAC), Artillery Forward Observation Officers (FOO), or Naval Gunfire Support Forward Observers (NGSFO) so that the data from a sensor or a ground-based observer can be directly beamed to the cockpit or wherever it is needed through data links. An example of this approach is the US Army’s Manned–Unmanned Teaming (MUM-T) project,<sup>141</sup> which envisages five levels of interoperability, linking unmanned air systems (UAS) to attack helicopters to perform increasingly challenging tasks. Part of this system’s approach is the use of data links and terminals, like the One System Remote Video Terminal (OSRVT), to exchange data from a JTAC to a cockpit. The ability of a ground-based JTAC to beam images to the cockpit of an attack helicopter would reduce the potential for misidentification, as well as reduce cockpit loading. It should be noted that this level of sophistication in joint coordination resides in very few States and is still under development. Wider access to this type of technology may also be limited. However, well-practiced staff processes and procedures with clearly defined command responsibilities will be a major factor for all States to mitigate risk.

### 5.6 ARTILLERY ADJUSTMENT OF FIRE

Adjustment of artillery fire is designed to cater for the inherent variabilities described above and can be used by low-capacity military organizations, as well as those with access to more technologically advanced

---

<sup>135</sup> Ibid.

<sup>136</sup> See page 32, Ibid.

<sup>137</sup> CNA is a US-based non-profit research and analysis organization.

<sup>138</sup> Lewis L, “Promoting Civilian Protection during Security Assistance: Learning from Yemen”, CNA, May 2019.

<sup>139</sup> “Afghanistan Civilian Casualty Prevention”, US Center for Army Lessons Learnt, no. 12-16, June 2012.

<sup>140</sup> Ibid.

<sup>141</sup> Iriate M, “MUM-T Operations on the US Army’s UAS Roadmap”, Military Embedded Systems. Available from <http://mil-embedded.com/articles/mum-t-armys-uas-roadmap/>.

capabilities. By selecting a point on the ground that is some distance from a population centre, it is possible to fire a single gun and then adjust line and range based on the actual fall of shot. These adjustments can then be sent to the other guns, once the observer is content. Another adjustment will bring the fall of shot from the observed adjusted point to the target. Alternatively, another method is to adjust the centre of mass of all the fired guns and then apply the final adjustment to the target. One challenge is that the elevation of the structures in an urbanized environment may interfere with the trajectory of the projectile<sup>142</sup> and therefore not hit the desired impact point. Errors can be reduced, but artillery is still an area weapon and its suitability must be considered before determining whether to fire into an urbanized environment.

## 5.7 RECORDING MUNITION EXPENDITURE

Accurate recording of munition expenditure is essential for the good conduct of operations. It facilitates operational assessments, provides insights into munition effectiveness assessments (MEA), supports investigations by Civilian Casualty Mitigation Teams (CCMT), provides information for public affairs officials for managing incidents, and supports lessons identified practices. Strike logs, comprising date, time, and munitions used, together with geolocational data and units involved will facilitate analysis, helping to identify issues, as well as to provide information to humanitarian organizations to plan their explosive ordnance risk education campaigns and land clearance operations. This is well conducted in air operations for fixed-wing aircraft, but not adequately done by artillery and rotary wing aircraft operators, though the United Nations specifies in detail what logs and records are to be maintained.

### Guiding questions for section 5: target engagement

- What needs to be done to strengthen the performance of armed UAV operations to mitigate civilian harm?
- How might cockpit loading be reduced to diminish human errors?
- Are there sufficient resources allocated to live firing? What is required? What does live firing provide that simulation is unable to emulate?
- How might precautionary warnings be made more effective? What methods are effective?
- How might lower-capacity organizations reduce systemic errors in their weapons and ammunition to mitigate civilian harm?
- How might misidentification issues be reduced?
- Do missions have adequate processes and procedures in place to safeguard ammunition to reduce the potential for deterioration and abnormal performance?
- How might healthcare objects be identified better by modern sensors?

---

<sup>142</sup> See this publication for deeper insights into the deployment of indirect fire weapons in urbanized environments: “What the Battle for Mosul Teaches the Force”, Mosul Study Group, no. 17-24 U, September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

## 6 Battle Damage Assessment and Lessons Identified

The final component to the life cycle approach is the conduct of battle damage assessment (BDA) and extracting any information that can support lessons identified, both from a theatre as well as an institutional perspective.

The purpose of BDA is to provide feedback on the performance of the mission (the measure of performance) as well as the effectiveness of the mission (the measure of effectiveness), which contributes to the assessment of an adversary's combat effectiveness, capabilities, intentions and possible willingness to fight. BDA also helps to determine whether there is a need to re-attack the target.

There are different models for conducting BDA, but generally they involve a tiered approach. Level 1 might comprise a Mission Report (MISREP) or In-Flight Report (INFLIGHTREP), sent as quickly as possible after a strike, the objective being to establish the level of physical damage. Level 1 BDA is generated within 1–2 hours of an event. Level 2 BDA might establish the functional damage to the target, drawing upon all-source intelligence. Level 3 BDA might be a Target System Assessment that assesses the overall impact on the Target System by the strike. Levels 2 and 3 BDA may take several days to produce.

The lessons identified process enables insights to be codified and then distributed to within one's own or partner military organizations so that their predeployment training is more effective, and that when deployed into a theatre of operations in the future they can better reduce harm to civilians.

### Key issues: BDA and lessons identified

- Quality and accessibility of information available
- Timeliness of reporting
- Capacity to investigate instances of civilian harm
- Communicating outcomes of assessments
- Amends policy/victim assistance
- Consistency of data for analytical purposes

### 6.1 QUALITY AND ACCESSIBILITY OF INFORMATION AVAILABLE

When a strike is conducted, ISTAR will be tasked with collecting data on the effects. This may range from full-motion video (FMV), signals intelligence (SIGINT), communications intelligence (COMINT), electromagnetic spectrum intelligence (ELINT) or other types of intelligence. Direct observation by a forward observer, reports from partner forces or other sources may also contribute. Additionally, there may be TV or radio coverage, multimedia uploaded on to social media or eye-witness testimony.

#### 6.1.1 Quality and reliability of information available post-strike

The quality and reliability of information post-strike presents several challenges to the military commander. First, most media platforms and social media users are not subject to the same requirements of accuracy in their reporting as that of a military commander, who may lose the confidence in those supporting the mission if details are wrong. Second, media organizations are competitive, meaning that being first-to-publish to create a commercial advantage may result in sacrificing accuracy, but poor accuracy undermines good journalism too. News broadcasters have exploited user-generated content (UGC) from social media users to identify potential stories. Some have recognized the potential quality challenges that citizen journalism presents and have put in place rigorous verification procedures.<sup>143</sup> The military commander is caught between being quick to make an announcement to gain the initiative and manage the narrative and the need for accuracy of its content, the failure of which presents a risk-to-mission. Organizations may also use deception, misinformation or disinformation to disguise the effects of a strike on a target or make allegations of civilian harm that are untrue.<sup>144</sup> Establishing truth quickly is a major challenge, but also an opportunity as it undermines false

---

<sup>143</sup> Saisho R, "Speed vs Accuracy in Time of Crisis", Reuters Institute Fellows' Paper. Available from <https://reutersinstitute.politics.ox.ac.uk/our-research/speed-vs-accuracy-time-crisis>.

<sup>144</sup> "Breaking Aleppo, Disinformation, Coda: The Battle Against the Coda", Atlantic Council. Available from <http://www.publications.atlanticcouncil.org/breakingaleppo/disinformation/>.

reporting by a third party. Good practices include commanders having media statements with pre-prepared supporting evidence ready before an attack takes place.

### 6.1.2 Accessibility of information available

Few military headquarters have enough analysts to cover the range of media platforms that could provide information to support BDA. They need to be able to monitor multiple platforms and sources for user-generated content. This takes substantial investment and therefore capacity constraints may have an impact on prioritization.

For those operations where there are no ‘boots on the ground’, gaining access to eye witnesses or the impact site is even more challenging and puts the military force at a distinct disadvantage, particularly when there are language or other cultural barriers. Moreover, there are documented cases where there has been tampering of sites to disguise the nature of the attack for deniability purposes.<sup>145</sup>

## 6.2 TIMELINESS OF REPORTING

**Timely reporting is required to correct potential errors in the planning and conduct of strikes, as well as to manage the consequences.**

While Level 1 BDA may be available within hours, there should be mechanisms to accelerate the passage of information when civilian harm might have been caused. Levels 2 and 3 BDA may take days to produce. Civilian organizations, like Forensic Architecture, undertake substantial investigations using multiple sources of imagery and reports, to provide detailed explanations of an attack, an example being their analysis of the airstrikes on M2 hospital in Aleppo which took place between June and December 2016.<sup>146</sup> Their report was published on 13 February 2017, some five weeks or so after the last attack. Given the importance of timely reporting for both in-operations and institutional learning, military forces should consider how to incorporate capacity and capability to investigate instances of civilian harm in detail.

Experiences in theatres of operation like Afghanistan have given rise to the creation of civilian casualty tracking cells, such as AMISOM’s Civilian Casualty Tracking and Analysis Cell (CCTARC), which track, investigate and report on allegations of civilian harm. However, these are not normally part of a peace-time manning of a headquarters, thus such capability needs to be identified in planning and necessary capacity generated, together with standard operating procedures. The NGO CIVIC has pioneered this work, closely collaborating with military headquarters. Within ISAF, the original civilian casualty tracking cell (CCTC) initially enabled the headquarters to have better situational awareness of civilian harm to address allegations,<sup>147</sup> but later it provided data to identify trends to support civilian casualty mitigation measures. Some States also made *ex gratia* condolence payments to soften the consequences of losses, but this was not uniformly applied over ISAF.

ISAF had the ability to dispatch troops or work with members of the Afghan National Army or Police to support their investigations, but it will not always be the case where there are no ‘boots on the ground’ to provide access. In such circumstances, more reliance will be placed on user-generated content, media and other reporting, including that from IOs/NGOs. The Research Team has found, however, that while effective reporting mechanisms exist under the Security Council in some areas of protection of civilians (such as the Monitoring and Reporting Mechanism (MRM) for children in armed conflict, as well as the Monitoring, Analysis and Reporting Arrangement (MARA) for sexual violence in armed conflict), mechanism for tracking, analyzing and reporting on civilian harm resulting from explosive weapons remain underdeveloped at this time.

It is for consideration as to whether military organizations should invest in more capacity to investigate key incidents to provide a higher level of confidence in their assessments of civilian casualties and improve comparison between CDEM and real outcomes. **This raises a series of questions: To what extent are**

---

<sup>145</sup> Chemical Attacks in Douma, Syria, Forensic Architecture, 18 July 2017. Available from <https://forensic-architecture.org/investigation/chemical-attacks-in-douma>. It took just over 3 months to complete the report.

<sup>146</sup> <https://forensic-architecture.org/investigation/airstrikes-on-m2-hospital>.

<sup>147</sup> Muhammedally S, “Minimizing Civilian Harm in Populated Areas: Lessons from Examining ISAF and AMISOM Policies”, International Review of the Red Cross, 2016. Available from [https://www.icrc.org/en/download/file/41586/irc\\_97\\_901-14.pdf](https://www.icrc.org/en/download/file/41586/irc_97_901-14.pdf).

**comparisons between CDE and actual outcomes evaluated and feedback provided? What capabilities are required to expedite investigation of incidents? How might this be done when there are no ‘boots on the ground’?**

### **6.3 COMMUNICATING OUTCOMES OF ASSESSMENTS**

To maintain support for a mission, it is important to be transparent and to take responsibility for mistakes, especially where civilian harm is caused. NGOs like Amnesty International<sup>148</sup> and Airwars<sup>149</sup> report on instances of civilian harm. It is not the purpose of this paper to judge the merits of these reports, but to highlight the fact that there are often wildly conflicting reports of the numbers of civilian casualties caused, highlighting the challenges posed for timely, accurate post-strike analysis. Timely, transparent reporting by the military is essential, but such reporting must be credible and needs resourcing. **The Research Team is interested to learn, drawing from experiences and lessons identified, how military forces might increase confidence in their assessments of collateral damage and civilian harm.**

### **6.4 AMENDS POLICY/VICTIM ASSISTANCE**

There is a growing recognition that those civilians who are harmed by military operations should receive assistance.<sup>150</sup> Often individual States decide as to whether they will offer victim assistance or not and brokering a multilateral approach is fraught with challenges. Article 36 argues that victim assistance should include “those who have been killed by, or have been injured and survived the use of specific weapons, as well as their families and wider affected communities”.<sup>151</sup> They include forcible displacement in this context,<sup>152</sup> raising important questions as to verification and implementation processes. **During the planning of operations, the question of amends and victim assistance should be considered and appropriate resourcing put in place.** This includes resourcing a civilian casualty tracking cell with the capacity to conduct field investigations, as well as resourcing amends and victim assistance. **The Research Team recognizes a need for further dialogue on how amends and victim assistance should be developed and implemented.**

### **6.5 ANALYSIS OF DATA TO INFORM LESSONS**

**Post-strike data collection and analysis enable detection of patterns or trends, which support remedial action can be taken. This not only supports BDA, but also the lessons identified process.**

Accurate post-strike assessments permit refinement of CDEM, but also to inform targeting decisions and tactics. Operational plans may contain data-collection worksheets for the conduct of operational assessments. However, it is worth considering whether more capacity and direction is required to support operational analysis activities by specifying clear data collection requirements. Further, some headquarters do not have dedicated operational analysis cells to lead such work. The requirement for operational analysis should be identified in planning stages and consideration given as to how reach-back to national facilities can provide additional decision support to commanders. Further, **the Research Team has identified a potential for improving operational analysis processes and a need to better mine lessons across operations to facilitate and accelerate learning.** Access to reports, such as the Mosul Study Group’s “What the Battle for Mosul Teaches the Force”,<sup>153</sup> which this paper cites frequently, presents a good practice example.

### **6.6 LESSONS IDENTIFIED**

Over time, many theatres develop their own lessons identified cells that capture good practices which are then shared in-theatre for implementation as well as with those forces coming into theatre during their predeployment training. These frequently focus on tactics, techniques and procedures. However, these lessons

---

<sup>148</sup> “US Airstrikes in Somalia Have Killed Civilians Despite Official Denials—A New Report”, Amnesty International UK Press Release, 20 March 2019. Available from <https://www.amnesty.org.uk/press-releases/us-airstrikes-somalia-have-killed-civilians-despite-official-denials-new-report>.

<sup>149</sup> “Credibility Gap United Kingdom Civilian Harm Assessments for the Battles of Mosul and Raqqa”, Airwars. Available from <https://airwars.org/wp-content/uploads/2018/09/UK-Inquiry-into-Mosul-and-Raqqa-2018.pdf>.

<sup>150</sup> “Explosive Weapons, Protecting Civilians from the use of Explosive Weapons in Populated Areas”, Article 36, August 2018.

<sup>151</sup> Ibid.

<sup>152</sup> Ibid.

<sup>153</sup> “What the Battle for Mosul Teaches the Force”, Mosul Study Group, no. 17-24 U, September 2017. Available from <https://www.armyupress.army.mil/Portals/7/Primer-on-Urban-Operation/Documents/Mosul-Public-Release1.pdf>.

do not always translate into institutional learning, because of national sensitivities in a multilateral setting, leading to dysfunctions, including where there are partners involved, based on limited capacity and capability. As one Iraqi officer lamented: “We were told to reduce civilian casualties, but we have not been told how to achieve that”.<sup>154</sup> Institutional learning involves taking the lessons identified, scrutinizing them for validity and then considering whether they have a doctrine, organizational or other implication. Changes to organizations or amendments to doctrine can involve long lag times before institutional change is embedded—measured in years, rather than hours, days or months. **The Research Team is interested in learning what more can be done to transform lessons identified into institutional lessons learned.**

#### **Guiding questions for section 6: BDA and lessons identified**

- How might improvements be made to enhancing the quality of BDA?
- How might capacity and capability be enhanced to assess civilian harm?
- How might communication of the outcome of assessments be improved?
- How might amends or victim assistance be implemented? What are the obstacles that need to be overcome?
- To what extent are comparisons made between CDE and actual outcomes? How does this feed changes to practice?
- How might data collection be improved to support operational analysis and provide feedback to targeteers?
- How might institutional learning be improved?

---

<sup>154</sup> “Policies and Practices to Protect Civilians: Lessons from ISF Operations against ISIS in Urban Areas”, CIVIC.

## **7 Conclusions**

The purpose of this paper is to provide food-for-thought for those attending the UNIDIR workshop in Geneva on 24 September 2019 so that options to strengthen military policy and practice to reduce civilian harm from explosive weapons in urban and other concentrated areas are identified for incorporation in a subsequent paper.

The Research Team has examined this issue from an enterprise risk perspective, covering the civilian harm mitigation life cycle. This is to say, rather than just focusing on the impact of the ordnance or projectile itself, the research looked at contributory factors ranging from planning to BDA. We will consider these issues and others in our September workshop, guided by the civilian harm mitigation life cycle, to aim for a comprehensive approach to better protecting civilians. The Research Team welcomes the identification at the workshop of new and additional practices and lessons learned from various contexts and operations.

This approach invites participants to consider the adequacy of doctrine, policy, organization, training and leadership, together with equipment and facilities, by raising guiding questions on which to focus, together with background information on the issues.



**UNIDIR**

UNITED NATIONS  
INSTITUTE FOR  
DISARMAMENT  
RESEARCH

**Opportunities to strengthen military  
policies and practices to reduce civilian  
harm from explosive weapons**

**Food-for-Thought Paper**