



EMERGING TECHNOLOGIES AND CIVILIAN HARM MITIGATION

Artificial Intelligence and other emerging technologies have the potential to reduce civilian harm in conflict. An analysis of over 2000 real-world instances of civilian harm identified 12 pathways to harm, all of which could be at least partially mitigated with the help of AI. Blockchain is another emerging technology being used by a promising system for collecting data on civilian and humanitarian presence in conflict zones.

Militaries around the world are rapidly adapting to leverage emerging technologies—such as artificial intelligence, autonomy, and blockchain—for a military edge. Similarly, NATO is working to leverage emerging technologies for collective security. While their goal is greater effectiveness and efficiency, the idea of adapting these technologies to military applications has also created considerable controversy. Many concerns have been voiced, including potential bias, security vulnerabilities and spoofing, and the desire to maintain human judgment and responsibility in the use of military force.

In international discussions regarding military applications of emerging technologies, the chief concern is whether applications of AI could be inherently indiscriminate. The fear is that inability to differentiate between valid military targets and civilians could make such systems incompatible with international humanitarian law (IHL). This concern is magnified by an increasing awareness of the importance of human security, including protecting civilians from harm in military operations. There are many practical reasons for militaries to mitigate harm to civilians, including the operational disruption that can result, the strategic impact of creating grievances that can prolong conflict, and the increasing transparency of the modern battlefield, which makes civilian harm much more visible and potentially damaging.

We analyzed over 2000 real-world instances of civilian harm occurring over the past 20 years of military operations.

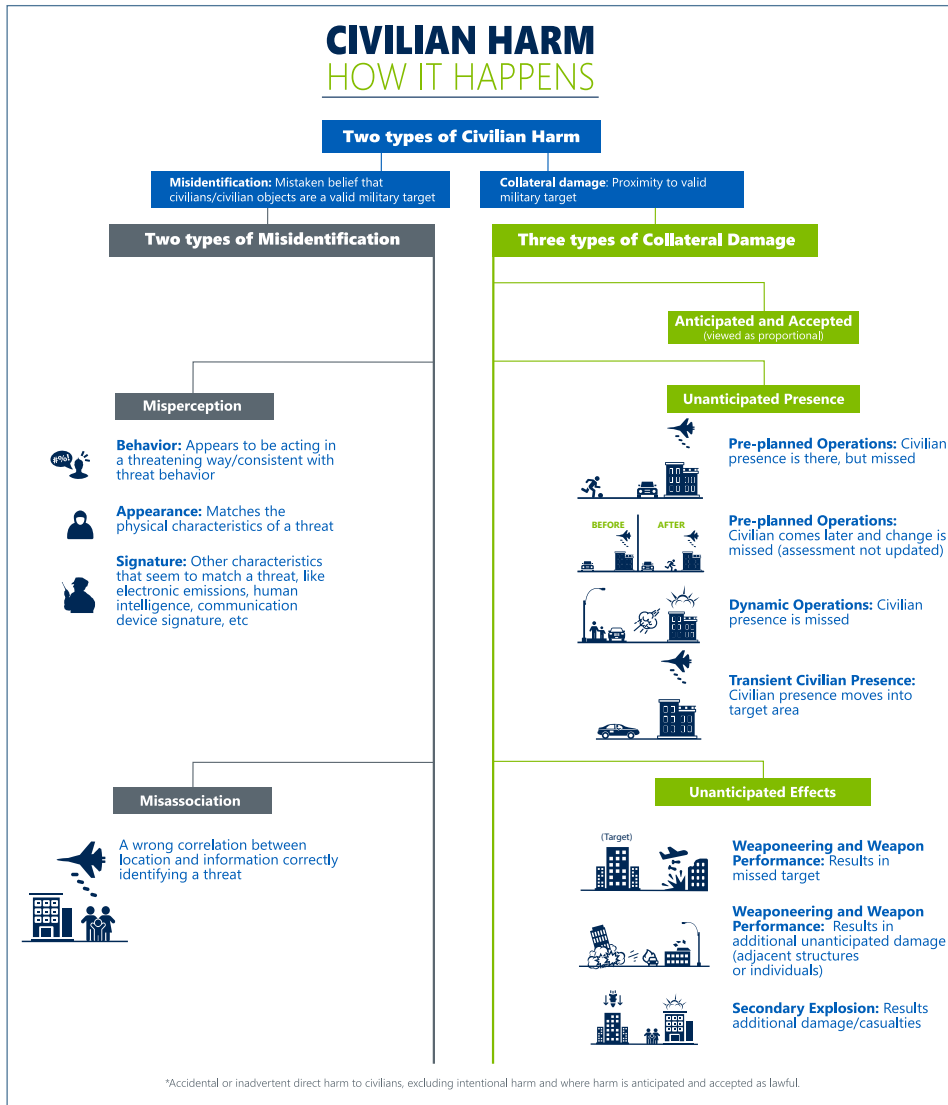
While risks from emerging technologies must of course be mitigated in military applications, such **discussions often omit a basic but critical fact: emerging technologies can also be used to mitigate harm** to civilians. This can be viewed as consistent with the affirmative responsibility under IHL for militaries to take all feasible precautions to protect civilians from harm. With regard to emerging technologies, militaries should not only be asking how to reduce harm to civilians. They should also be asking: **How can we use emerging technologies to protect civilians from harm?** And how can these technologies be used to lessen the infliction of suffering, injury, and destruction of war?

AI FOR MITIGATING HARM TO CIVILIANS

AI is a technology that can excel in solving specific, well-defined problems. Considering how AI could be used to better mitigate civilian harm, we first need to identify the specific problems that lead to civilian harm. To this end, we analyzed over 2000 real-world instances of civilian harm occurring over the past 20 years of military operations. We determined that **all civilian harm incidents share at least 1 of 12 possible pathways to harm**. These pathways are shown in the figure on the following page.

There is no solution that will completely eliminate the problem of civilian harm—military operations will always have a non-zero risk to civilians. Based on our analysis of particularly beneficial mitigation steps that are amenable to AI applications, we have described several functions to address civilian harm. These are just a few of the promising starting points:

- **Alerting the presence of transient civilians.** AI applications can use object-identification to automatically monitor for additional individuals around the target area and send an alert if they are detected. This would bring them to the attention of operating forces that can otherwise fixate on the target and miss transient civilian presence.



- **Detecting a change from collateral damage estimate.** AI applications can find differences in imagery from that used to determine the collateral damage estimate to support targeting decisions and more recent imagery taken right before an engagement. This can help surface little details that operating forces might not recognize in the heat of the moment. These could be cues of unanticipated civilian presence, such as additional vehicles near a building. Warnings from an AI system might avoid a common reaction after strikes of buildings: “I didn’t know there were people there!”

- **Alerting a potential miscorrelation.** Other AI applications can help to identify that a miscorrelation has taken place. For example, applications that recognize a vehicle being tracked is not the same one that was tracked previously, showing that a swap has occurred between a threat vehicle and a civilian vehicle.

symbols. AI methods could identify symbols for designating protected objects—such as the red cross or red crescent—and alert the operator or the chain of command. This capability would provide a safety net in case the protected symbol is present but missed by operating forces, a more likely occurrence today because modern battlefield sensors are attuned to the infrared part of the spectrum, making colored protective symbols less likely to be seen.



BLOCKCHAIN FOR MITIGATING HARM TO CIVILIANS

Military targeting processes and supporting systems tend to rely on intelligence regarding the threat. While today's conflicts typically involve operations where civilians are present, the civilian environment is a blind spot for targeting. Information about civilian populations, humanitarian organizations, and civilian infrastructure is often inaccurate or incomplete. In our analysis, most incidents of civilian harm include **deficiencies in knowledge of the civilian environment**: unnoticed civilians in proximity to the target, civilians misidentified as combatants, or humanitarian activities not recognized.

Fixing this blind spot by improving knowledge of the civilian environment would strengthen mitigation of civilian harm. To this end, **USAID is leading the development of a new communication system**—the Human Security Information System (HSIS)—to provide a secure means to improve the fidelity and completeness of the civilian environment picture.

HSIS will use blockchain technology, which creates a cryptologically secure set of records that is built up over time through distributed transactions. The use of blockchain in HSIS provides the security that only intended parties can access the information. It also features incorruptible records, creating an audit trail that can be leveraged for learning and accountability. The system will make it easier for organizations to report and update their information individually to increase timeliness of submissions, and in formats that promote accuracy. Civilian information such as critical infrastructure, cultural heritage sites, medical facilities, and other civilian objects can be reported either by individual organizations or collectively by a trusted agent on their behalf.


The standard format and data structure of HSIS promotes interoperability and integration with military systems, where the civilian information can be imported directly into military systems over data links like Link 16. HSIS can improve the overall quality and consistency of civilian information over current ad hoc processes, **simplifying the work of militaries to integrate it into military systems** and processes and creating a stronger foundation for effective mitigation of civilian harm.

MITIGATING HARM TO HUMANITARIAN ORGANIZATIONS

Humanitarian organizations occupy a special niche in the civilian environment of conflict zones, and the HSIS solution could also help protect their activities. Humanitarian organizations operating in conflict zones have special privileges and protections under IHL. According to IHL, parties to the conflict must ensure the free movement of humanitarian activities and take all feasible precautions to avert or minimize the loss of humanitarian personnel, facilities, equipment, and supplies. Formal humanitarian notification processes have emerged over the last few decades to help maximize opportunities for parties to the conflict to reduce the potential of attacking or impeding humanitarian actors and activities.

That said, these processes are still largely ad hoc in nature, and vary from theater to theater. This situation has resulted in a number of challenges for militaries and humanitarian organizations:

- Different processes and expectations from theater to theater
- Multiple, incompatible notification systems
- Different submission formats and requirements to manage
- Data accuracy and duplication challenges
- Latency in reporting and processing
- Little visibility into the security and distribution of submissions



Given this, it is not surprising that there is often a lack of trust between humanitarian groups and militaries regarding the humanitarian notification process overall.

For humanitarian notification to result in improved protection requires effective deconfliction—where the military uses this information to avoid an inadvertent attack. But deconfliction often works poorly in practice. The 2015 US attack on a Médecins Sans Frontières (MSF) hospital in Kunduz and many attacks on humanitarian entities by the Saudi-led coalition in Yemen—point to the need for improving processes to promote more effective deconfliction.

HSIS can be applied to support humanitarian notification and deconfliction. This system and associated processes are an opportunity to improve trust between humanitarian groups and militaries, address long-standing challenges of humanitarian notification associated with current, ad hoc processes, and improve the work and effectiveness of militaries overall.

For example, the building and the maintaining of a no-strike list should be informed by humanitarian information provided through the HSIS, validated through other means as appropriate. The security and traceability of the information system may streamline the process, reducing the steps needed by militaries for validation.

HSIS civilian and humanitarian information could also improve pattern-of-life determinations used to distinguish targets. This process is threat-centric, which can lead to cognitive bias and the misidentification of humanitarians as valid military targets—as occurred in the 2015 MSF incident. The inclusion of HSIS information in pattern-of-life determinations could help address that bias and help protect against misidentification.

WHY MITIGATE CIVILIAN HARM?

While protecting civilians has intrinsic value, many leaders fail to recognize a key addition benefit: mitigating the risk of civilian harm can lead to greater military effectiveness. A common myth is that militaries must reduce their use of force if they are to protect civilians. And some view mitigation of civilian harm and military effectiveness as a zero-sum game: believing that seeking one goal has a cost on the other.

But CNA analysis of military operations has shown that **it is possible to simultaneously improve military effectiveness and lessen civilian harm**. Operational data shows that working to mitigate civilian harm can improve a military's ability to avoid targeting mistakes and become more effective against intended targets. The history of U.S. military operations over the past 20 years shows that the U.S. has achieved this when it meets two requirements: (1) the U.S. military takes a comprehensive approach that integrates mitigating civilian harm into all aspects of planning and operations and (2) the U.S. military is dedicated to learning and improvement, both in the midst of operations and from one operation to another.

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