

Autonomous systems, private actors, outer space and war

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Concerns surrounding outer space and military applications of technological advances are not new. However, the rapidity and scale of modern technological developments has made these conversations more pressing. In addition, the ability of non-State entities, such as private companies, to enter the space and military technology playing fields has dramatically transformed the use of space. Autonomous craft will increasingly form a key part of human space exploration and utilisation, including potentially during times of armed conflict. The legal issues arising from the use of emerging technologies in space and armed conflict are amplified for systems involving autonomous functionality, which invoke further complications surrounding attribution of activity. The actions of autonomous systems in space – including those of commercial space providers – could theoretically constitute

a use of force and drag a relevant State (or States) into a situation of international armed conflict. This possibility is just one of the complexities that emphasises the need for States to find ways to monitor and regulate these activities so as to avoid any such consequence.

The law applicable in outer space is challenged by new technologies and the proliferation of private actors

The Outer Space Treaty (OST) did anticipate future human and technical capability by acknowledging that non-State entities may undertake activities in space. The OST was, however, specific in linking the actions of such non-State entities to a State as a 'national activity' under Article VI of the OST in a manner



that broke new ground concerning traditional requirements for State Responsibility. The first semi-private venture into space occurred with the launch of an AT&T satellite, Telstar 1, on July 10, 1962.¹ However, in the first few decades of human space activity the reach of non-government entities into space was limited. In recent years (and particularly since NASA's 2003 *Columbia* space shuttle tragedy), it has become evident that private industry is leading the economic and technical charge into space. Hence, of the \$370 billion global space economy in the 2021 calendar year, an estimated 75% was non-government commercial spending, with the vast majority dedicated to navigation and satellite communication technologies.²

This increase in private space activity has necessarily resulted in more interactions between objects in space. Recent events have highlighted the current congestion problems: with satellites passing dangerously close to one another³ and admissions that errors in space could have had potentially disastrous consequences.⁴

The law applicable in armed conflict is challenged by new technologies – in particular the proliferation of autonomous systems

The law of armed conflict (LOAC) has always anticipated technological development. Additional Protocol I to the Geneva Conventions approaches the question of military technological advancement by anticipating the future development of new 'means and methods of warfare' and taking a principled approach to regulation - rather than one which makes reference to any specific technology. Notwithstanding this, not all the potential capabilities of AI informed autonomy are envisaged by the general rules. It is understandable that the drafters of the laws of war could not have envisaged every possible implication of technological development. Autonomous Weapons Systems could have their own specific LOAC regulation, but uncertainty is stifling these discussions and much of this relates to accountability. The Group of Governmental Experts on emerging technologies in the area of lethal autonomous weapons systems (GGE LAWS), formally established in 2016, has, to date, not been able to reach any consensus on the way forward.⁵

LOAC clearly does apply to LAWS, and some States have sought to provide clarity as to their views on the application of the accountability framework to lethal autonomous weapons systems (LAWS) and have focused on the retention of 'human control'. However, this is a topic that needs further consideration by a greater number of States. Of particular note are Article 3 of the 1907 Hague Convention (IV) and Article 91 of Additional Protocol I, which provide that a State is responsible for 'all acts committed by persons forming part of its armed forces'. This is the LOAC specific version of the principle of State Responsibility at international law. The rules of State Responsibility provide that a State is responsible for its internationally wrongful acts and those that are attributable to it. Rule 149 of the ICRC's Customary IHL study notes this principle in relation to violations of LOAC and the ICRC notes the military manuals of Argentina, Canada, Columbia, Germany, Netherlands, New Zealand, Nigeria, Russian Federation, Switzerland, United Kingdom, United States and Yugoslavia as supporting State practice for this point.⁶ Although, as Fleck points out, there have been a number of challenges for those seeking compensation for acts committed by State armed forces, there is evidence of a move towards victims of violations being able to seek reparations under this principle.⁷

It is not clear how State responsibility would work in the case of the use of an AWS. Chengeta has articulated ways in which

a State would assume responsibility for the actions of an AWS using the wording where an AWS 'end[s] up violating protected rights'.⁸ However, this itself seems to accept that the AWS is the entity that violates the rights, rather than the user or person making the decision to use in the circumstances. The connection between human and machine is just one of the many conundrums when it comes to working out how the law should deal with accountability for the use of an AWS.

There are unanswered questions about accountability for actions in outer space

On its face, Article VI of the OST establishes a very strict regime of responsibility between a State and non-State entity, such as a company, regarding 'national activities' in outer space. This was the very intention of that provision. When it comes to issues of liability and the fraught nature of space travel and activity, it makes perfect policy sense to cast as broad a liability net as possible to ensure that care is taken by all. However, when it comes to employing force contrary to Article 2(4) of the UN Charter and/or initiating an armed conflict under the terms of common Article 2 the 1949 Geneva Conventions, a perverse consequence follows. The prevailing test under international law in such circumstances to determine if a State has violated these obligations via a non-State entity is that of 'effective control'.⁹ Article VI of the OST in its clear wording instead suggests attribution at a much lower threshold. This leaves open the possibility of States being drawn into armed conflict unwittingly by the actions of private companies and other non-State entities.

It is readily conceivable that such autonomous systems, whose use in the vacuum of space is only going to increase, will inevitably malfunction from time to time. When they do, it is very possible that collisions, physical damage and other tragic consequences will follow. It seems contrary to public policy to conclude that thereby States are violating the prohibition on the use of force and/or initiating armed conflict, even where the State had no prior intention or even knowledge of such illegal activity triggered by an autonomous system and even where such activity was not the result of any intentional human decision. Yet, this is what Article VI literally establishes and it necessarily expands the potential likelihood that States will be drawn into armed conflict because of programming errors, miscalculations and other such unanticipated actions.

However, despite these stark propositions, there is hopefully some room for acknowledging the 'uncontrolled' nature of AI authored decisions of autonomous systems. Hence there is an argument for concluding that if it such an action were a 'mistake' then it will be excluded from the scope of use of force and armed conflict. It has in fact been stated that LOAC does not apply to 'situations that are the result of a mistake or of individual *ultra vires* acts ... even if they might entail the international responsibility of the State to which the individual who committed the acts belongs'.¹⁰ This could encompass situations discussed above concerning autonomous systems going 'haywire'. That said, it is not entirely clear what the requirements for *ultra vires* and mistake actually are in this context. Where does the mistake lie when a State does not build in 'failsafe' protocols or otherwise does not anticipate such systems independently 'deciding' to cause damage to others in space?

Ultimately, there is no available State practice on how or whether an autonomous action by a space object would be attributed in the space context.

In launching an autonomous system into space against the strict

responsibility background described above, is there also a need to conduct an Article 36 weapons review? Given the existing legal regime applicable to space, coupled with the ongoing debate regarding the lawfulness of autonomous weapons systems, it would seem prudent at the very least for States to undertake close assessment of such systems before launch, even if not formally undertaken in accordance with the obligations under Article 36.

Themes and Possible Solutions Regarding Autonomous Systems in Space and War

Accountability for international law violations is an ongoing conversation. This is not the case just because of new technological developments, although of course some of the ambiguity stems from the opacity of such systems' functioning to those not directly involved in their development. Rather, it is because of the challenge of seeking international agreement as to how States may be held to account across the board in a number of areas of international law.

With this in mind we focus here on three solutions. The first is more robust domestic laws controlling the deployment of autonomous devices, particularly in space. The second, is to acknowledge the role of 'military diplomacy' to establish a practical working framework for construing intention and establishing safe zones for autonomous systems. The third is a new approach, some kind of collective or 'team' responsibility that would sit alongside State Responsibility or International Criminal Law.

Conclusion

The role of autonomous systems across many aspects of military operations raises challenging questions surrounding the application of the legal framework. The development of existing international law did not contemplate the level of autonomy already evident in modern technology and this does leave some uncertainty going forward, particularly regarding who is responsible when things go wrong. It is in this way that the deployment of autonomous weaponry raises various accountability questions for both the law of armed conflict and space law.

There are however, constructive avenues available to States in seeking to resolve these. These include taking the initiative with domestic law, engaging in military-to-military diplomacy to establish basic operating standards and, finally, exploring concepts of collective responsibility to ensure that errors are addressed meaningfully and in a manner that avoids individual blame. Sophisticated technology, especially autonomous systems, seems to be an inevitable reality of space exploration and armed conflict going forward. Avoiding the legal and physical dangers resident with the deployment of such systems and taking advantage of their capabilities will be key to ensuring the humanitarian ends of both the regulation of outer space and of armed conflict. ●

- 1 NASA, 'July 12, 1962: The Day Information Went Global' (31 January 2018) <<https://www.nasa.gov/topics/technology/features/telstar.html>>.
- 2 Euroconsult, 'Euroconsult estimates that the global space economy totaled \$370 billion in 2021' (Press Release, 11 January 2022) <<https://www.euroconsult-ec.com/press-release/euroconsult-estimates-that-the-global-space-economy-totaled-370-billion-in-2021/>>.
- 3 Joey Roulette, 'OneWeb, SpaceX satellites dodged a potential collision in orbit', *The Verge* (9 April 2021) <<https://www.theverge.com/2021/4/9/22374262/oneweb-spacex-satellites-dodged-potential-collision-orbit-space-force>>.
- 4 Marina Koren, 'NASA Will Only Tolerate So Much Danger', *The Atlantic* (11 February 2020) <<https://www.theatlantic.com/science/archive/2020/02/boeing-nasa-starliner-software-problems/606361/>>.
- 5 Report of the 2021 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022) [18]: 'The Group considered different proposals on how to reflect the deliberations including possible conclusions and recommendations of the Group, but no consensus was reached.'
- 6 Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law* (Cambridge University Press, 2005) vol 1, rule 149.
- 7 Dieter Fleck, 'International Accountability for Violations of the "Ius in Bello": The Impact of the ICRC Study on Customary International Humanitarian Law' (2006) 11(2) *Journal of Conflict & Security Law* 179, 185.
- 8 Thompson Chengeta, 'Accountability Gap: Autonomous Weapon Systems and Modes of Responsibility in International Law' (2016) 45(1) *Denver Journal of International Law & Policy* 1, 47.
- 9 *Military and Paramilitary Activities in and Against Nicaragua (Nicaragua v US)* (Merits) [1986] ICJ Rep 14 [115]; Draft Articles on State Responsibility art 8.
- 10 Tristan Ferraro and Lindsey Cameron, 'Article 2: Application of the Convention' in International Committee of the Red Cross (ed), *Commentary on the First Geneva Convention* (Cambridge University Press, 2016) 68, [241].



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