AUSTRALIA OUT OF THE LOOP

WHY WE MUST NOT DELEGATE DECISION MAKING IN WARFARE FROM MAN TO MACHINE

SARAH CALDWELL & MATILDA BYRNE (ED)

SAFEGROUND INC, MELBOURNE 2020

SAFE GROUND

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CAMPAIGN TO STOP KILLER ROBOTS

SAFEGROUND IS A MEMBER OF THE CAMPAIGN TO STOP KILLER ROBOTS

SAFEGROUND INC, MELBOURNE 2020

TITLE: AUSTRALIA OUT OF THE LOOP
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SAFEGROUND IS PROUD TO PRESENT THIS ONLINE PUBLISHING REPORT. IT IS PART OF OUR EFFORTS IN THE CAMPAIGN TO STOP KILLER ROBOTS. WE HOPE THE REPORT BRINGS MUCH NEEDED ILLUMINATION OF THE AUSTRALIAN CONTEXT ON THE ISSUE OF FULLY AUTONOMOUS WEAPONS, ACROSS MULTIPLE DIMENSIONS AND SECTORS OF SOCIETY.

IF YOU HAVE ANY QUESTIONS REGARDING THIS REPORT OR OUR WORK PLEASE CONTACT MATILDA BYRNE (BYRNE.MATILDA.J@GMAIL.COM / INFO@SAFEGROUND.ORG.AU) OR VISIT SAFEGROUND.ORG.AU

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CONTENTS

EXECUTIVE SUMMARY

Fully autonomous weapons, also referred to as lethal autonomous weapons systems or *killer robots*, are defined by an ability to select and engage a target without meaningful human control. The selection of targets and the use of lethal force against them all take place without a human *in the loop*. The Australian Campaign to Stop Killer Robots strives to maintain meaningful human control over the use of force. This must be done through the establishment of a pre-emptive ban on fully autonomous weapons. Such a ban includes prohibition of the development, production and use of fully autonomous weapon technologies, however, it will not affect positive and peaceful applications of autonomy. The Campaign to Stop Killer Robots believes that the ban should be achieved through an international treaty or other legally binding instrument. Implementation through national laws would ensure that countries remain compliant.

Currently, the Australian government holds the position that a ban is premature, although it has acknowledged the considerable risks associated with the technology. Australia's spending in the area of Artificial Intelligence (AI), unmanned technology and autonomous systems is rapidly increasing and the Department of Defence has not, to date, ruled out developing fully autonomous weapons. The Australian government must heed the widespread appeals of AI experts, representatives of the United Nations such as Secretary General António Guterres and non-government organisations (including the 160 worldwide who comprise the Campaign to Stop Killer Robots) among others. Australia must take a strong moral stance and demonstrate global leadership to join with those states calling for a ban.

AUTONOMOUS WEAPONS & AUSTRALIA

ABBREVIATION INDEX

ADF – Australian Defence Force

AI – Artificial Intelligence

CCW – Convention on Certain Conventional Weapons

CRC – Cooperative Research Centre

DMTC – Defence Materials Technology Centre

DoD – Department of Defence (of the United States of America)

GGE – Group of Governmental Experts

ICRC – International Committee of the Red Cross

IHL – International Humanitarian Law

LAWS – Lethal Autonomous Weapon Systems

LOAC – Australian Law of Armed Conflict Manual

MIDAS – Melbourne Information Decision and Autonomous Systems

NSW – New South Wales

STELaRLab – Science Technology Engineering Leadership and Research Laboratory

TAS – Trusted Autonomous Systems

UN – The United Nations

UNSW – University of New South Wales

INTRODUCTION

It has been said that fully autonomous weapons will be the third revolution of warfare following gunpowder and nuclear weapons. Their potential to exacerbate current and future conflicts, by removing a human from the loop poses too high a risk for the international community and humanity.

This report is seeking to engage Australians and outline the concerns around fully autonomous weapons. This will be done by examining the international climate, the moral, ethical and legal arguments as well as four key sectors: defence, arms manufacturers, universities and tech.

This report is specifically designed to inform parliamentarians, defence personnel, artificial intelligence (AI) experts and other interested groups and encourage them to speak out in support of a pre-emptive ban. States like Australia need to show moral leadership and join others in calling for the negotiation of a ban on fully autonomous weapons. To date, the position of the Australian government has been disappointing. The Department of Defence and the Australian Defence Force (ADF) are ambiguous about whether they intend to develop these weapons. For Australia to do so would be unacceptable. Australia should be proactive instead of reactive and prevent such weapons from ever claiming a victim.

A lack of meaningful human control in the 'critical functions' of selecting and engaging targets has raised serious concerns within the international community. Notably, the lawfulness of fully autonomous weapons and their ability to comply with international humanitarian law (IHL) has been interrogated. Further, it is also deemed morally and ethically wrong for a machine to decide who lives and who dies when it does not possess human consciousness nor characteristics to make such a complex and ethical decision.

Since 2015, international discussions regarding this issue have taken place at the Convention on Certain Conventional Weapons (CCW). However, there has yet to be a mandate for real action. Whilst many states are calling for a ban in the form of a legally binding instrument (such as a treaty), progress is being held back by a handful of states - including Australia.

In Australia, there has been a rapid increase in the advancement of development and application of autonomous technologies within defence, as this report will outline. There are explicit projects researching 'killer robots' as well as a steady move toward unmanned machinery which, in the future, will have the ability to remove the human from the loop.

Australia's collaboration with private arms manufacturers such as Thales Australia, BAE Systems, and DefendTex must be highlighted. Private manufactures are able to import and export the technology and would benefit from an international robotics arms race.

University partnerships funded by the Department of Defence are another cause for concern. The majority of Australian universities conduct research in collaboration with defence through their engineering or technological departments. This report calls for universities to initiate policies that will ensure that their developments do not contribute to fully autonomous weapons.

The Report also urges the private technology

sector to initiate policies that ban these developments or implement legally binding contracts with defence that explicitly forbid the use of their technology in this morally unconscionable way. The tech sector and the development of tools such as AI, machine learning and robotics offers great positive advancement for current and future generations. Dual-use issues and stigmatisation of tech relating to fully autonomous weapons are harmful to the industry and and caused by fully autonomous weapons, are among the reasons why it is instrumental for everyone in this sector to speak up and promote a pre-emptive ban.

Throughout this report, it will be made clear why development, production and the use of fully autonomous weapons must be banned. Australia has the opportunity to be a world-leader on this issue. The Australian government is called upon to commit to never develop or use fully autonomous weapons and urged to support their prohibition internationally.

Moral and Ethical Arguments

One of the biggest questions associated with the discussion of fully autonomous weapons is whether they are morally and ethically acceptable. With the potential development of fully autonomous weapons not so far in the future, we must ask 'would we feel comfortable with robots taking a human life?' and 'what does it mean for humanity if we outsource the act of killing to an algorithm?'

Former United Nations Secretary General Ban Ki Moon has deemed these weapons 'morally repugnant'[1] and indeed delegating the decision to kill a human to a machine crosses a moral 'red line' and is an affront to human dignity.

International Humanitarian Law (IHL) establishes the requirement that machines «be used with appropriate restraint and respect for humanity.» [2] Respect for humanity requires meaningful human control over the use of lethal force. Humanity has the capability to feel emotions such as empathy or compassion towards others and act on instinct.[3] Machines have no appreciation for the value of life and therefore must not be enabled to take life autonomously.

Throughout human history we have seen wars and periods of violence. However, humankind has evolved its morals and ethics which has been reflected in how war is conducted. Today it is expected that measures are taken to limit the numbers of casualties and protect civilians in conflict. Fully autonomous weapons would mean that instead of trained military personnel, technology would make the decision to target and when. Noel Sharkey, co-founder of The International Committee for Robot Arms Control has stated;

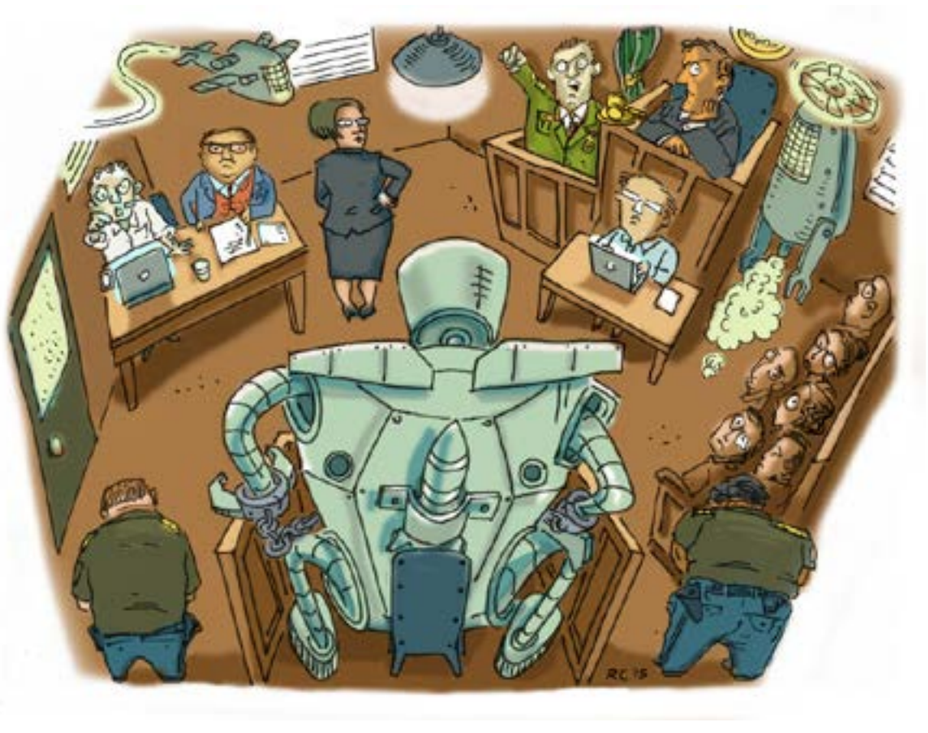
> Rather than making war more humane and ethical, autonomous armed robotic machines are simply a step too far in the dehumanization of warfare. We must continue to ensure that humans make the moral decisions and maintain direct control of lethal force.[4]

Australia has asserted that ethics can be programmed into weapons systems and because of these aspirations they assert that it is too early for a pre-emptive ban. However even if the machine can make ethical judgements it remains amoral due to the fundamental breach of human dignity associated with delegating a kill decision to a machine. Further, the use of such weapons would «trigger International Human Rights Law.»[5]

Notwithstanding the moral argument and whether weapons can be programmed to behave ethically, other ethical considerations have been raised. Proponents of these weapons have pointed to the removal of soldiers from warfare as a benefit; an opportunity to save human lives. However the need to send troops deters states from initiating wars. Removing troops lowers the threshold for war, increasing the likelihood and occurrence of conflict. This means that ultimately more people, in particular civilians, would be harmed. The ability to fight without soldiers further enables conflicts of an imperialistic nature and enhances asymmetry.

As a responsible, moral and ethical global actor, Australia must oppose the development of fully autonomous weapons on these grounds.

Below: © Russell Christian, Human Rights Watch, 2015.



LEGAL CONCERNS

The development and deployment of fully autonomous weapons are not only morally and ethically problematic but also would contravene international law. This section outlines the incompatibility of such weapons with international humanitarian law (IHL) and the need to bolster existing laws to adequately address these new age weapons. It outlines the three pillars of international law; distinction, proportionality and precaution as well as the Martens Claus and issues of accountability.

International law was founded in order to establish appropriate conduct between states. It aims to set standards and obligations for interstate behaviour in times of peace and war through treaties, conventions and customary laws. One function of international law is to minimise humanitarian harm. If states breach international law there are measures to hold them accountable, whether that be reputation loss or retribution.

When considering fully autonomous weapons, the most widely discussed and relevant legal apparatus is international humanitarian law. There are two branches of IHL: The Law of Geneva and the Law of the Hague.

They are defined as follows by the International Committee of the Red Cross:

> The body of rules that protects victims of armed conflict, such as military personnel who are hors de combat and civilians who are not or are no longer directly participating in hostilities [The Law of Geneva]
>
> The body of rules establishing the rights and obligations of belligerents in the conduct of hostilities, and which limits means and methods of warfare [The Law of the Hague][6]

IHL expanded from these two branches and through customary law and legislation has grown to set the international standards of all conflicts.

Distinction, Proportionality and Precaution

Customary international humanitarian law dictates that militaries must make decisions based on distinction, proportionality and precaution. In Australia these principles have been legislated at a domestic level through the Australian Law of Armed Conflict (LOAC) manual.[7]

The principle of distinction dictates that militaries must be able to distinguish combatants from civilians at all times. This is so that civilians and their property are not attacked during times of conflict.

LAOC defines the principle of distinction as;

> A requirement to distinguish between combatants and civilians, and between military objectives and civilian objects. This requirement imposes obligations on all parties to a conflict to establish and maintain the distinction.[8]

Fully autonomous weapons lack the capability to comply with distinction. Scientists may program machines to identify particular symbols, however, weapons cannot possess contextual knowledge needed to interpret visual cues.

There are previous examples of weapons which have been banned in international law as they are unable to discriminate between civilians and combatants. Such cases include the 1997 Mine Ban Treaty regarding landmines and 2008 Convention on Cluster Munitions.

An argument may claim that programmed machines would have a lesser error rate in engaging non-combatants than a soldier due to their lack of emotions, however human compassion and reasoning allows soldiers to make nuanced decisions in conflict. For instance, a machine may be programmed to recognise a gun as a weapon and therefore its carrier a combatant but a child may pick up a gun from the ground in a warzone. This kind of knowledge cannot be programmed into fully autonomous weapons leading to situations where a machine may engage a wrong target, where as a person would have exercised judgement and restraint.

Proportionality is equally important in decision making over the use of lethal force. It ensures those engaged in conflict uphold the broader principles of military necessity and humanity which underpin international humanitarian law broadly. These principles are described by the International Committee of the Red Cross as follows;

> The principle of military necessity permits only that degree and kind of force required to achieve the legitimate purpose of a conflict.The principle of humanity forbids the infliction of all suffering, injury or destruction not necessary for achieving the legitimate purpose of a conflict.[9]

Proportionality, as defined by LAOC in article 5.9, requires;

> A commander to weigh the military value arising from the success of the operation against the possible harmful effects to protected persons and objects. There must be an acceptable relationship between the legitimate destruction of military targets and the possibility of consequent collateral damage.[10]

Proportionality ensures the military gain in any attack warrants any collateral damage. This is an inherently human judgment highlighted by the choice of the term 'weigh' to describe a commander's actions. This requires understanding the strategic value of an act in a specific context which cannot be pre-programmed or quantified in a machine. Therefore, fully autonomous weapons would be unable to apply proportionality without a human in the loop.

Precaution is outlined in Article 5.53 of LAOC which states;

> All reasonable precautions must be taken to avoid injury, loss or damage to civilians and civilian objects and locations… While the LOAC recognises that civilian casualties are unavoidable at times, a failure to take all reasonable precautions to minimise such damage may lead to a breach of those laws. The same principles apply to the risk of damage or injury to any other protected persons, places and objects.[11]

Given the threat that fully autonomous weapons pose to civilians, maintaining meaningful human control is the only way to ensure sufficient precautions have been taken when selecting and attacking human targets.

The Martens Clause

The development of fully autonomous weapons is also in conflict with the Martens Clause, another important aspect of international humanitarian law. It was first established in the 1977 Additional Protocol which stated;

> In cases not covered by this Protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derwived from established custom, from the principles of humanity and from the dictates of public conscience.[12]

The Marten Clause has been subject to many iterations but is designed to fill gaps in existing international laws. Fully autonomous weapons, which are not yet specifically addressed in any international law, fall under the Martens Clause. No human control over the selection and engagement of targets contravenes the principle of humanity, which renders it unlawful.

Public conscience is another indication of why

fully autonomous weapons are deemed illegal under the Martens Clause. It was demonstrated through the open letter by AI experts that both global and Australian public conscience is against the development of these technologies because it crosses a moral 'red line.'

Accountability Gap

There are clear gaps in accountability when it comes to fully autonomous weapons. Both international humanitarian and human rights law require there to be clear accountability to adhere to legal obligations. These weapons pose further challenges to these legal obligations because it is still unclear as to who would be responsible if a fully autonomous weapon engaged a target wrongfully. Legally and morally machines cannot be held accountable which means that the responsibility would fall on the commander or programmer.

In international criminal law, prosecuting crimes requires two elements. First, there must be a criminal act, the *actus reus*. Second, the act must be perpetrated with a certain mental state, or *mens rea.* Fully autonomous weapons would most certainly commit criminal acts but could never be of *mens rea* as machines have no mental state.

The Australian LOAC manual outlines that the commander is the last point of call for ac-

countability. However, this accountability is «only triggered if a commander has actual constructive knowledge of the crime»[13] that is to be committed. With humans out of the loop incorrect target selections or a disproportionate attack by the weapon is beyond a commander's knowledge and control.

Further to this, international criminal law dictates that;

> A human could be directly responsible for criminal acts committed by a robot only if he or she deployed the robot *intending* to commit a crime, such as wilfully killing civilians.[14]

Due to the phenomenon of the 'black box' in artificial intelligence, no one knows how a machine processes and reaches certain decisions. If someone deploys a fully autonomous weapon they cannot foresee an error. Consequently, if a human is removed from the loop there is an accountability gap. The only way to ensure accountability is to retain meaningful human control over the use of lethal force and ban the development and use of fully autonomous weapons.

The Campaign to Stop Killer Robots has long advocated for new, clear, specific international law to address fully autonomous weapons. During a statement to the Convention on Certain Conventional Weapons (CCW) in November 2019 a spokesperson stated;

> A new international ban treaty is the normative framework that's urgently needed to prevent a dangerous future of lethal autonomous weapons systems. A new treaty is both achievable and necessary. It is a humanitarian priority and an ethical obligation.[15]

Due to the advanced nature of fully autonomous weapons, existing laws are not adequate to alleviate the risks. This is why new international law is needed to bolster and clarify the existing laws.

Australia's Legal Position

The Australian government however, does not recognise the urgency in implementing a new legally binding instrument. Rather they contend that current laws are sufficient for addressing concerns regarding fully autonomous weapons. The government argues that adhering to existing obligations, in particular, Additional Protocol I of the Geneva Convention, is enough to halt any risks associated with the development of these weapons.

The Australian government has stated that;

> Australia fully supports and adheres to the obligation to undertake a review of any new weapon, means or method of warfare to determine whether its employment would, in some or all circumstances, be prohibited by International Humanitarian Law or other international law by which Australia is bound.[16]

Although the intention of the Australia government to review new weapons and adhere to current international laws and obligations is appreciated, it remains the case that fully autonomous weapons would violate such laws. During Senate Estimates in October 2019, Department of Defence Deputy Secretary of Policy and Strategic Intelligence Peter Tesch said "now and into the future, all ADF weapons are and will be compliant with our legal obligations."[17]

If the above statement is true, Australia would never deploy a fully autonomous weapon after conducting the review process.

It therefore appears contradictory that Australia has failed to rule out developing these weapons. To uphold their commitments to international law the Australian government must join with other states in calling for a legally binding instrument to universally ban fully autonomous weapons.

Above: Celia Perkins First Assistant Secretary Strategic Policy speaks at Department of Foreign Affairs and Department of Defence Senate Estimates, October 23, 2019 Canberra

Below: Campaign delegation name plate at the Convention on Certain Conventional Weapons, Group of Governmental Experts meeting in August 2019

CURRENT GLOBAL CLIMATE

Discussions surrounding autonomous weapons and possible regulation at an international level are ongoing and it is important to grasp these proceedings and Australia's role in them. This section presents a brief history of diplomatic talks, the current state of play including recent developments and plans as well as Australia's regrettable position and conduct.

The first official concerns regarding fully autonomous weapons were raised on the 1st of August 2010 in a report by the United Nations (UN) Special Rapporteur Philip Alston on extrajudicial, summary or arbitrary executions. In this report Prof. Alston, an Australian international law and human rights scholar, asserted;

> Urgent consideration needs to be given to the legal, ethical and moral implications of the development and use of robotic technologies, especially but not limited to uses for warfare.[18]

Since this first expression of concern, numerous states, non-government organisations and experts in AI have spoken out against the development and deployment of fully autonomous weapons and have urged for a treaty to be negotiated prohibiting these weapons to ensure meaningful control over the use of lethal force is maintained.

In May 2013 a debate on fully autonomous weapons was held at the Human Rights Council and at the end of the year at a meeting of the Convention on Certain Conventional Weapons (CCW) states agreed to a mandate on beginning to address lethal autonomous weapons systems in 2014.

The CCW is a framework convention whose purpose «is to prohibit or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately.»[19] Therefore, it is the natural forum in which to discuss fully autonomous weapons within the UN apparatus.

On May 13th, 2014 the CCW saw the first of 8 meetings on fully autonomous weapons that have been held over the last 6 years at the UN in Geneva. At the 2015 CCW Review Conference states established a dedicated 'Group of Governmental Experts (GGE) on lethal autonomous weapons systems' to handle the issue. 2018 saw the group draft *Guiding Principles*.[20]

Although the majority of states had expressed a desire to proceed with negotiating a legally binding instrument, by the end of the 2019 GGE meetings, the recommendation for 2020 and 2021 was restricted to the continuation of discussions on how and if a further framework may be necessary. It was agreed that the GGE group would meet over two 5-day sessions each year, however, amid COVID 19 it is uncertain how and when the scheduled meetings will unfold in 2020.

In 2019 however, discussions around fully autonomous weapons also emerged outside of the CCW forum. Ahead of the first committee meeting of the UN General Assembly, Germany and France launched an initiative called the 'Alliance of Multilateralism' which describes itself as;

> [an] informal network of countries united in their conviction that a rules-based multilateral order is the only reliable guarantee for international stability and peace and that our common challenges can only be solved through cooperation.[21]

Above: Chair of Nobel Women's Initiative Jodie Williams and Campaign to Stop Killer Robots Coordinator Mary Wareham outside the United Nations in New York for the meeting of the UNGA First Committee with campaign mascot David Wreckham, October 2019

It identified 6 priority initiatives including the regulations of fully autonomous weapons systems, with its declaration;

> encourage[ing] states to promote the worldwide application of the eleven guiding principles as affirmed by the GGE [Group of Governmental Experts] and... to work on their further elaboration and expansion.[22]

States are also hosting their own multilateral meetings in order to advance the conversation on fully autonomous weapons. On the 20th of February 2020, Brazil hosted the Rio Seminar on autonomous weapons. This seminar included panels on human control and the need for a new treaty. The seminar was attended by representatives from Brazil, Chile, China, Germany, Russia, and the United States, to name just a few. There were also representatives from the CCW Secretariat including the Chair of the Group of Governmental Experts (GGE)for 2020/21, Mr. Jānis Kārkliņš of Latvia, the Campaign to Stop Killer Robots and the International Committee of the Red Cross.

Germany also invited all CCW states and the Campaign to Stop Killer Robots to meet in Berlin on the 18th and 19th of March 2020. However due to the Covid-19 pandemic, the global meeting was instead broadcast online. More than 70 countries contributed to this online meeting, the goals of which were to;

> Explore the international framework and commitments needed to address mounting concerns over the dangers of removing meaningful human control from the use of force.[23]

Other states have announced their intention to convene multilateral meetings. Austria and Japan had offered their intention to host meetings in late 2020 and early 2021 respectively. The international community is awaiting further communication on these meetings.

Currently 30 states have confirmed their support for a ban on fully autonomous weapons, affirming the need to negotiate a legally binding instrument.[24] The Non-Aligned Movement, a grouping of 120 states have also declared their support. In a 2019 meeting of the CCW the Austrian delegation stated;

> It is a legal, ethical and moral imperative that humans must remain in control of armed conflict and that human control over the weapons developed, deployed and used is maintained.[25]

At the GGE in 2019, 15 states expressed their support for a political declaration when offering individual statements. These states include the UK, France, Germany, and New Zealand. The issue with a political declaration is that it is not legally binding but rather an instrument in which states can demonstrate their aspirations.

The Australian position however, continues to be amongst the least ambitious of all states involved. They assert that general best practices, a code of conduct, or a compilation are adequate enough to combat the future issues tied to fully autonomous weapons. Only a select few states have disapproved of any form of binding or nonbinding instrument; Australia, along with Russia, the US, Israel, and India.

Australia has had consistent attendance at diplomatic meetings regarding this issue. However, Australia maintains that existing international law is adequate. For instance, on March 26th, 2019 Australia submitted a report to the GGE that stated;

> If states uphold their existing international law obligations and implement a thorough internal process of regulations, there is no need to implement a specific ban on AWS [autonomous weapons systems], at this time.[26]

Australia, should support the bolstering of international laws and champion disarmament. Instead, the delegation consistently avoids engaging in dialogue on human control, and repeatedly points to the weapons review process, which deflects attention from the core discussion. In 2014, at the Informal meeting of experts on lethal autonomous weapon systems (LAWS) held by the CCW, this statement was given and has been repeatedly reiterated, including at the 2019 GGE meeting;

> Australia fully supports and has a policy to undertake a review of any proposed new weapon, means or method of warfare to determine whether its employment would, in some or all circumstances be prohibited by international humanitarian law or any other rule of international law.[27]

At another meeting of the GGE in November 2017, Australia proclaimed that a «sweeping prohibition of autonomous weapons systems» is premature, although they «recognise the risks associated with these systems.»[28] Australia is not engaging with the nuanced debate of the CCW, which is detrimental to the forum's progress.

Meanwhile it has become clear in recent years that Australia has not hindered any development in this area of weaponry, with the Department of Defence and the Australian Defence

Force (ADF) innovating in this area, which will be discussed in the following section.

In regards to questions about maintaining meaningful human control, in 2017 the then Foreign Minister Julie Bishop stated that;

> The Australian Defence Force relies on the chain of command to execute its objectives and it is Australia's Policy that there will always be human interaction with autonomous systems.[29]
>
> However, this language is worrying as it does not secure that a human will be in control over the use of lethal force.

States who already support a ban will continue to advocate for a legally binding instrument within CCW discussions, and it is imperative that more countries, including Australia, join this call in order for the international community to work towards a new treaty or convention that adequately addresses the concerns and risks associated with fully autonomous weapons.

Right: Campaign delegation at UNGA First Committee meeting, October 2019 - United Nations New York

Below: Chief of Defence Force General Angus J Campbell at Department of Foreign Affairs and Department of Defence Senate Estimates being questioned on autonous weapons, October 23 2019

DEFENCE AND AUTONOMOUS WEAPONS

The Australian Defence Organisation encompasses the Australian Defence Force (ADF) and the civilian Department of Defence (referred to here in combination as 'defence'). Australian Defence holds an ambiguous stance when it comes to fully autonomous weapons. This section outlines their rhetoric and funding for autonomous capabilities through highlighting in particular the Defence Strategic Update and initiatives including *Trusted Autonomous Systems (TAS)* Defence Cooperative Research Centre (CRC) and defence and ethics deliberations.

The ADF has a policy that lethal decision making during the conflict will always include a human however, they do not specify the degree of human control or involvement.[30] During Senate Estimates in October 2019 Chief of Defence Force General Angus J Campbell declared;

> ...there is no one answer now and there is not going to be one answer in the future with regards to where is the human in this system[31]

The ADF repeatedly expresses its full adherence to international law and specifically the weapons review process which applies to all of the current projects being undertaken. Defence construes 'human control' in relation to conducting these reviews, but shirks it in relation to the selecting and engaging of targets, to create the illusion of engaging with international debate.

Meanwhile, the Department of Defence is allocating significant funds for developing autonomous systems and embarking on extensive research in this area. It is, therefore, even more important that Australia has a clear, delineated red line which it will not cross; removing meaningful human control over the use of lethal force.

The 2018-2019 federal budget included various forms of funding for the advancements of artificial intelligence (AI) including an «AU$29.9 million (about US$21.7 million) funding package over four years to develop the artificial intelligence and machine learning capabilities.»[32] This package includes; «Development of a national AI Ethics Framework and Standards Framework to address ethics for adopting such technologies in Australia.»[33] However, on the issue of AI in military applications, the discussion is largely confined to within defence itself, which will be detailed later in this section.

The Government also allotted AU$25 million for Defence Cooperative Research Centres with a focus on AI advancements. The Coalition also committed to investing 2 percent of the GDP in the ADF between 2020-2021. This includes «$1.6 billion to ensure our Defence Forces remain at the cutting edge of technology by expanding opportunities for Australia's innovation and research and development.»[34]

2020 Defence Strategic Update

Australia's 2020 Defence Strategic Update, released along with the 2020 Force Structure Review Plan, announced defence expenditure totalling AU$270 billion for the following 10

years. The update made defence's intentions to continue developing its autonomous capabilities clear, asserting that in Australia's changing strategic environment,

> emerging and disruptive technologies will be rapidly translated into weapons systems, including autonomous systems...reducing decision times and improving weapon precision and lethality.[35]

The Force Structure Review identifies a range of autonomous systems which will be developed amongst Australia's capabilities. In the maritime domain this includes aerial systems, uncrewed-surface and underwater systems. Up to AU$11.1 billion is allocated for autonomous land vehicles with a «coordination office for the implementation of robotics and autonomous systems across the land force» to be established.[36]

A significant area for autonomy is in air vehicles and aerial systems. Alarmingly, the Update identifies the acquisition of loitering munitions and options to invest in «autonomous combat aircraft.»[37] In January 2020, Defence announced the 'Loyal Wingman' project. In a partnership with Boeing Australia, 3 prototypes of fully autonomous aircraft are to be built;[38] This sees Australia skirting this troubling fine line.

The government will contribute AU$40 million to 'Loyal Wingman'[39]. This project clearly constitutes part of the plan stated in the Force Structure Review Plan, that «new and existing aircraft will combine with remotely piloted and autonomous systems to provide increased lethality and survivability.»[40]

It would be unacceptable for Australia ever to develop fully autonomous weapons. There is great cause for concern when projects like Loyal Wingman are undertaken in absence of any guarantee to retain meaningful human control over the use of lethal force.

Trusted Autonomous Systems (TAS)

Defence demonstrated its commitment to innovating in the area of autonomy in the 2016 Defence White Paper. The White Paper outlined the establishment of The Next Generation Technologies Fund for defence research and innovation. The White Paper identified 9 priority areas including *Trusted Autonomous Systems.* The fund supports the establishment of Defence Cooperative Research Centres which are a collaboration between defence, Australian universities and other research agencies and industries to a total of AU$370 million over the decade ending June 2026.

In 2017 Trusted Autonomous Systems (TAS) was the first of the centres to be launched. It was awarded AU$50 million over its first 7 years. Its core collaborators are the Department of Defence, BAE Systems Australia, DefendTex and RMIT University. Trusted Autonomous Systems (TAS)'s stated objective is to;

> Deliver world-leading autonomous and robotic technologies to enable trusted and effective cooperation between humans and machines.[41]

Trusted Autonomous Systems (TAS) has embarked on various projects. This includes Distributed Autonomous Spectrum Management «to research, develop and demonstrate near real-time autonomous spectrum management»[42] as well as a Cognitive Intelligence Surveillance Reconnaissance Electronic Warfare project using machine learning integrated with an uninhabited system.[43]

Another project is the Justified Autonomous Unmanned Aerial Systems Effects which is designed to;

> Research and develop autonomous live reconnaissance effects assessment using AI and machine vision for day and night UAS [Unmanned Aerial Systems]operation over land.[44]

Above: The unveiling of the first prototype from the Loyal Wingman project in May 2020, photograph supplied by Boeing

When completed, «the system aims to advise operators on the legal and ethical aspects of fire support missions in near-real time.»[45] Systems like this, which assist human decision making can form a positive advancement to defence capabilities.

These projects are led by private companies such as Boeing, Skyborne Technologies, Cyborg Dynamics Engineering and Consunet with research assistance from Australian Universities including RMIT University, University of Melbourne, University of Sydney and University of Queensland. These projects also have support from the Department of Defence Science and Technology Group.

Innovation for defence including artificial intelligence and robotics should not be precluded from our nation's agenda. However research must always be guided by international law, morality and ethics. Trusted Autonomous Systems (TAS) must operate with a clear red line which delineates which developments are not acceptable.

The most worrying initiative is a research project attempting to embed ethics and law into the programming of autonomous weapons. The partnership is between Trusted Autonomous Systems (TAS), The University of Queensland and University of New South Wales Canberra with AU$9 million in funding.[46]

The project «represents the biggest investment in the ethics and law of autonomous systems anywhere in the world.»[47] This effort to successfully program ethics into fully autonomous weapons, though misguided, explains the Australian government's insistence on 'keeping the door open'.

Defence and AI Ethics

The above project is an attempt by Defence to support its stance that a ban is *premature* and illustrate its consideration of ethics. Even if it

were to be successful, many of the concerns would remain unaddressed and this simply detracts from international progress. Furthermore, it only engages with a fraction of the ethical implications.

Defence also held a 3 day *Ethical* AI *for Defence* workshop in Canberra at the end of July in 2019. The purpose as stated by the Defence Science and Technology Group was for "the principles from this workshop [to] support the development of military leadership and ethics research, and doctrine development, in the Centre for Defence Leadership and Ethics and across Defence."[48]

A new, dedicated chapter of the Australian military doctrine on the ethics of AI uses in defence is to be released in late 2020. Such an initiative is welcomed but Australia should not hesitate to rule out fully autonomous weapons in the meantime.

Regarding the initiative, Air Vice-Marshal Cath Roberts, head of air force capability stated;

> This workshop is a key activity in developing Defence's understanding in this critical area. Our focus is on how to ensure appropriate action and moral responsibility for decisions, and continuously evaluating which decisions can be made by machines and which must be made by humans.[49]

Defence presents the question as a problem they are trying to 'solve' when there is one basic principle - decisions over selecting and engaging targets cannot be delegated to a machine. It begs the question why Defence will not commit to maintaining meaningful human control.

Further insight regarding defence's work on this area was presented during the Robotics Roadmap for Australia V2 process. The Roadmap is an initiative driven by the CSIRO to outline a strategy on robotics and AI for Australia across all areas and industry.

The workshop for the *Defence Sector* was held on April 23, 2020, chaired by CEO of Trusted Autonomous Systems (TAS), with representatives from all 3 branches navy, army and airforce of the ADF and Australian Strategic Policy Institute.

Royal Australian Navy Commander and Lead for Autonomous Warfare Systems Paul Hornsby said in an assessment of an autonomous platform «there were times when things are so busy that it is beyond human endurance or human response time, and you really want to crank up the robotics, and crank up the AI and there are other times where you would draw it back.»[50] This is another example of the vagueness which shirks the question of human control over lethal force.

Army Lieutenant Robin Smith cited many concerns such as cyber risks, and questions of *trust* in machines; «Trust that they'll work properly trust that they'll always work, trust that they can't be interfered with, trust that they will not hurt us»[51], which point to the need to ban fully autonomous weapons. He acknowledged there were «ethical issues associated with autonomy and what we will or will not automate»[52] without committing to not develop fully autonomous systems.

Defence are certainly engaging with the idea of ethics but until they rule out fully autonomous weapons such initiatives are hollow. Australia can support a ban while it explores the ethics of integrating AI for other uses in defence.

Repercussions of Full Autonomy

The pursuit of military advancements is shared throughout the ADF, with the main goal to establish itself as a driving force on an international level. It is the strong alignment between Australia and the United States that encourages these advancements as Australia strives to prove itself as an innovator and contributor. However the ADF should demonstrate its readiness to act morally, ethically and lawfully even if this differs from the position of the United States.

Australia partakes in modern conflicts but there has always been the consideration of *boots on the ground*. Fully autonomous weapons lower the threshold of war for the ADF and all other defence forces. This means conflict is more likely to occur, and more often as states will be more likely to initiate or consent to joining conflict because these weapons alleviate the risk to their soldier.

The international community also risks an arms race;

> Arms racing behaviour is a perennial concern for the great powers, because efforts by competing states to gain a technological advantage over their rivals, or to avoid falling behind, often lead to excessive and destabilizing arms build-ups.[53]

Further, it is particularly concerning as;

> A race in autonomy poses a particular danger because the consequences of investing machines with increased intelligence and decision-making authority are largely unknown and could prove catastrophic.[54]

The nature of these weapons means that war would be amplified and accelerated, there is also an increased risk of escalation due to the likelihood of machine error. The security of these weapons and hacking is another constant threat.

Furthermore, with fully autonomous weapons the «dynamic would likely shift the burden of armed conflict from combatant to civilians.»[55]

These risks to global stability should be apparent to the ADF, who, in considering their own operations and how this alters their role, should conclude that it is necessary to support a legal instrument that will retain meaningful human control over the lethal force and the soldiers in charge of lethal decision making.

There is no doubt AI and technological advancements have positive applications for Defence. Defence, however, must not cross the threshold of removing the human from decision making in targeting and the use of lethal force.

Above: Warmate loitering munition on display at Zbroya ta Bezpeka military fair, Kiev, 2017 - photograph by VoidWanderer

PRIVATE ARMS MANUFACTURERS

Private arms manufacturers are a driving force for the development of fully autonomous weapons[56]. Certain companies have demonstrated their promotion of, and dealing in, weaponisation of autonomy. Defence both partners with private manufacturers for certain projects and procures independently undertaken developments.

Lockheed Martin, DefendTex, Boeing, Thales, and BAE Systems are the largest private manufacturers involved in the development and importing of military technology in Australia, and therefore will be highlighted. Other examples will also be offered that illustrate procurement of autonomous weapons from international companies.

Lockheed Martin, DefendTex and Boeing are particularly problematic as they strive for innovations in autonomy in the absence of any policies regarding fully autonomous weapons. Whilst overtly not announcing work on fully autonomous weapons, these companies are developing various unmanned technology and loitering munitions which pave the way to full autonomy.

Lockheed Martin has worldwide connections and offices in order to advance their international standing. Lockheed Martin Australia are partners with;

> Australia's leading universities and the Defence Science and Technology Group and have established a multidisciplinary research and development centre - STELaRLab.[57]

Science Technology, Engineering Leadership & Research Labratory (STELaRLAB) includes autonomy and AI as part of its advanced technologies programme. Lockheed Martin Australia is leading the charge in autonomous capabilities as an innovator. Lockheed Martin is a vocal advocate for human-machine collaborations. They proclaim that; «Unmanned technologies enable our systems to go farther, operate longer and succeed in harsh or dangerous conditions.»[58]

Australian owned **DefendTex**, is also implicated in autonomous weapons development. Their website states;

> DefendTex services military and law enforcement communities around the world. [Their] vision is to be a world leader in defence technology with a wide portfolio of locally designed and manufactured defence technologies equipping the Australian and allied defence forces.[59]

One particular project that DefendTex has produced is Drone 40 which is a loitering munition that was developed for the Royal Australian Army in Melbourne, Australia. Whilst human control is currently the main part of Drone 40, multiple drones have the ability to use sensor data from one drone in order to start an autonomous swarm.

Projects such as Drone 40 demonstrates that, where there is a demand for emerging technology, companies are willing to supply it regardless of ethical considerations.

Boeing is one of the world's largest arms producers. Boeing Australia is a large base for development and importation.

> Boeing has the broadest portfolio in Australian aerospace… advanced manufacturing of… defence systems design and development, modelling and simulation, research and development, support and training, and unmanned systems.[60]

Boeing has a worldwide reputation for making technological advancements. They have stated that;

> Autonomy will define the next 100 years – and Boeing is driving the safe innovation and integration of autonomy to maximize human potential.[61]

Boeing Australia works on an array of unmanned vehicles and aircraft, including the autonomous aircraft prototypes as part of the Loyal Wingman project outlined earlier in this report.

Thales and BAE Systems have been considered a 'medium risk' to the advancement of fully autonomous weapons by the report *Slippery Slope: The arms industry and increasingly autonomous weapons* by peace organisation PAX.[62] Both companies have expressed stances on human involvement in decision making, however, neither have reflected this in their legal policies and procedures.

Thales Australia are «part of a leading international electronics and systems group serving the defence, aerospace and space, security, and transport markets in Australia and throughout the world.»[63]

The CEO of Thales, Patrice Caine stated the company's position on keeping meaningful human control on the 2nd of October 2017 during a LinkedIn article where he stated;

> Our vision: humans are crucial to critical decision-making. Consciousness is what makes us human, what distinguishes us from robots, and it's also the crucial factor in making a decision.[64]

This would suggest Thales would fall shy of developing a fully autonomous weapon.

BAE Systems is part of the world's five largest arms manufacturers. Statements from October 2016 suggest they recognise the importance of human control;

> In favour of delegating to a machine tasks that it can do more effectively, but humans must remain in control and should continue to take the big strategic decisions. The use of autonomous technology or AI does not mean loss of command, the removal of the individual or the abdication of responsibility for decisions[65]

BAE Systems Australia is a large contributor to the ADF, as well as being a partner in Trusted Autonomous Systems (TAS). BAE Systems supply and maintain numerous weapons systems such as;

> Advanced naval air defence systems like the Nulka Active Missile Decoy and the Evolved Sea Sparrow Missile System.[66]

Though they are major distributors of arms, their moral sentiment that humans must stay in control suggests they would not endorse their developments being used in fully autonomous weapons. This however cannot be guaranteed, especially given their involvement with Trusted Autonomous Systems (TAS) which has not clarified the level of autonomy being explored.

Furthermore, individual companies supply and support the growth of fully autonomous weapons in Australia through the importation of advanced technologies.

This was recently seen through the agreement to supply the loitering munition titled *Warmate* to the The Royal Australian Air Force. Polish arms manufacturer WB Group and Australian company Cablex signed an agreement "covering the distribution and local integration of the *Warmate* loitering munitions system».[67]

This saw the two companies;

> collaborate to meet emerging ADF capability requirements for autonomous systems, based on world-leading WB designs, adapted and enhanced by Cablex to provide underpinning and improved Australian sovereign capabilities, particularly in the emerging area of loitering munitions.[68]

Loitering munitions are the first step towards full autonomy;

> Loitering munitions focus on a target area for some time, constantly searching for targets, which it then attacks upon detection. These weapon systems enable faster reaction times against hidden or concealed targets that only emerge for a short period.[69]

Warmate can be loaded with a warhead in order to engage a target, and although a human has to turn this function on it is unclear whether they are in control of the engaging and firing process.

Supply and demand offers private arms manufacturers increased profit if they can innovate in emerging technological capabilities, as long as states are seeking these advancement. A ban is instrumental in preventing development and procurement, as private manufacturers are influenced by the stigma of unlawful weapons. Meanwhile we urge these companies to recognise that fully autonomous weapons fall beyond a red line and refrain from developing or supplying them.

Below: STELaRLab Melbourne, as publicised by Lockheed Martin Australia at:
https://www.lockheedmartin.com/en-us/news/features/2017/stelarlab-demonstrating-the-art-of-the-possible.html

AUSTRALIAN UNIVERSITY DEFENCE INDUSTRY PARTNERSHIPS

Defence has vast partnerships with Australian Universities as they rely on the institutes for research and development[70]. Through these partnerships, defence gains access to research in many valuable fields. Currently autonomous systems and technology, that can be adapted to facilitate full autonomy, are a central part of these programs.

Universities receive funding for taking part in these partnerships which makes them appealing. Multiple Australian universities stand out for their involvement with defence and consequential potential contributions to fully autonomous weapons. The majority of these universities have contracts that give exclusive rights to technology developed in research to defence under funding agreements.

The Engineering and IT departments are prevalent in the development of these technologies through their contributions to machine manufacturing and algorithm coding. However law and psychology departments are also progressing the advancements through their research.

State government initiatives are a key part of building relationships between defence and universities. The NSW Defence Innovation Network, for example, is;

> A university-led initiative of the NSW Government and the Defence Science and Technology Group to enhance NSW Defence industry capability through collaboration with government and academic research institutions. [71]

The universities involved in the Network include The University of Sydney, University of Technology Sydney, Macquarie University, University of Wollongong, Western Sydney University, University of Newcastle, and University of New South Wales Sydney.

The Network was founded in 2017 and has a specific project focused on «AI, Cyber, & Autonomous Systems», and is working to advance significant advancements for intelligent autonomous systems.[72] There are no apparent policies within the universities involved that withhold their research from being used in the development of fully autonomous weapons. Universities need to be aware that these weapons are being explored by defence and should have clear policies that they will not support this form of development.

The Defence Science Institute, is a similar endeavour, funded by the State Government of Victoria, the Department of Defence's Science and Technology Group and the member-universities.[73]

Established in 2010, Defence Science Institute's objective is to;

> Harnesses the capabilities of Victoria's universities to deliver integrated multidisciplinary solutions for the defence sector and facilitate the growth of defence science research networks between academia, DST [Defence Science and Technology] and defence industry.[74]

As part of the Defence Science Institute, researchers are conducting work on trusted autonomous systems such as; «Autonomous technologies and tools for high risk, difficult or remote tasks and increasing efficiency and operational flexibility.»[75]

The University of Melbourne, Deakin University, Federation University of Australia, La Trobe University, Monash University, RMIT University and the Swinburne University of Technology, are all listed as having commenced work in this field. Like the member universities of NSW Defence Innovation Network, there are no apparent policies to suggest research by these universities does not support the development of fully autonomous weapons.

Through the Defence Science Institute, other relationships have formed in the pursuit of advanced technology. In particular, the University of Melbourne, who initially helped the establishment of Defence Science Institute, has also formed a relationship with private arms manufacturer Lockheed Martin. In 2016 this relationship resulted in the establishment of Science, Technology, Engineering Leadership & Research Laboratory (STELaRLab).

Just like the Defence Science Institute, STELaRLab has a focus area on; «Exploring hypersonics, autonomy, robotics and command, control, communications, computing, intelligence, surveillance and reconnaissance.»[76]

Along with the Universities mentioned, Melbourne-based RMIT University is particularly problematic due to their vast and extended involvement in the research and development of these technologies. They also don't have any policy or procedures in place to maintain ethical or legal conduct with regard to fully autonomous weapons.

RMIT University, a partner of the ADF for over 100 years, was an «inaugural founding company members,»[77] of Trusted Autonomous Systems (TAS) Defence Cooperative Research Centre. The initiative is a nationwide project that also involves Flinders University, University of Sydney, Queensland University of Technology, University of Melbourne, University of Adelaide, Deakin University, Australian National University, and Griffith University.

Along with their involvement in Trusted Autonomous Systems (TAS), RMIT University formed the Sir Lawrence Wackett Centre which supports; «the transformational growth of Australia's Defence and Aerospace Industry»[78]

The Centre has; «expertise in every stage of product development from concept, design and testing through to policy and implementation.»[79]

Defence Materials Technology Centre (DMTC) is another national partnership initiative. The following universities are involved; The University of Tasmania, University of Wollongong, University of Melbourne, University of Queensland, Swinburne University, RMIT University, University of New South Wales, Flinders University, Monash University, Deakin University, Griffith University, University of Western Australia, University of Adelaide, University of Technology Sydney, and the Queensland University of Technology.

The centre aims; «to provide technology solutions enabling industry to enhance Australian Defence and national security capability.»[80]

Their research has had success in «incorporating automated offline programming» into machines such as their autonomous welding machine which incorporates offline autonomous mapping.[81] Instead of producing a specific product «DMTC's activities focus on development of industry capability», such as *identifying technology gaps* within defence and security industries.[82]

Autonomous mapping, when applied to non-lethal technology, is a positive advancement. However, in the absence of a clear policy restricting the repurposing of this technology, it can be used to develop weapons that cross an ethical and legal red line.

In addition to government-initiated partnerships with universities, independent research projects undertaken by the university can be sought out by defence. Relevant research conducted by universities extends beyond autonomous systems and unmanned vehicles. Other technologies such as sensors and tracking technology, which are components of fully autonomous systems are also developed and pursued by defence.

The University of Sydney is home to the Australian Centre for Field Robotics which is one of the largest robotics institutes in the world.

The main focus of the institute is «research, development and application of autonomous and intelligent robots, and systems for use in outdoor environments.»[83]

It has explicit agreements with defence in order to advance the Defence Autonomous and Uninhabited Vehicle Systems research. This was seen in 2008 through their partnership with The Defence Science and Technology Organisation in order to form a new Centre of Expertise focusing on the development of this technology.[84]

The University of Melbourne also participates in independent initiatives through the established Melbourne Information, Decision, and Autonomous Systems (MIDAS) Laboratory which is considered to be at the *forefront of autonomous systems research.*[85] They focus on producing;

> technological advances in automation, control systems, analytics, machine learning and system optimisation for robotics and swarms of networked distributed autonomous systems[86]

Although they are not directly partnered with defence, they do supply them with technology and prototypes.

Universities that are developing these tech-

Below: Dr Jessica Whyte speaks at panel event on autonomous weapons hosted by University of New South Wales Sydney's Grand Challenges, April 2020

nologies in one department are being questioned and opposed in another regarding ethics and legality.

During an interview Monash University ethicist Rob Sparrow stated that he worries;

> «That we're being sold a potentially very destabilising technology that makes war more likely by the promise it will lower non-combatant casualties.»[87]

Dr Jessica Whyte from the University of New South Wales Sydney, also questions the legality of this technology stating that; «if a machine is programmed to select its own targets, there are real questions about who will be responsible if it kills civilians or violates international humanitarian law.»[88]

Currently, there is no easily identifiable policy held at any Australian university that limits or restrains the use of research and technology developments for weapons, and in particular fully autonomous weapons which we know defence are still seeking to explore. This is concerning as universities should not be involved in the development of unlawful and unethical systems.

Due to the nature of the technology, it is crucial that clear policies are put in place to ensure they are not used to impact or exacerbate current or future conflicts. Along with this, universities need to speak out in support of a pre-emptive ban on fully autonomous weapons.

THE TECH SECTOR

The Tech community plays a crucial role in the choice to develop fully autonomous weapons. Companies and individual workers have a role in halting the development of fully autonomous weapons. Worldwide, tech workers support a ban on fully autonomous weapons, with 247 organisations and more than 2000 individuals having signed the 'Lethal Autonomous Weapons Pledge'.[89]

However, until a ban is in place, workers are faced with the reality of their technologies being repurposed and the challenge of innovating potential 'dual-use' technologies. Companies, therefore, need to adopt policies that protect their work from use in fully autonomous weapons.

The first big mobilisation of tech company employees occurred in the United States at Google. Employees opposed military contract Project Maven which;

> focuses on computer vision -- an aspect of machine learning and deep learning -- that autonomously extracts objects of interest from moving or still imagery.[90]

Google employees boycotted the development of this program by demanding that the company withdraw from the contract with the Department of Defence of the United States (DoD). The International Committee of Robot Arms Control showed their support of the initiative in an open letter which stated;

> We wholeheartedly support their demand that Google terminate its contract with the DoD, and that Google and its parent company Alphabet commit not to develop military technologies and not to use the personal data that they collect for military purposes.[91]

The open letter was signed by «scholars, academics, and researchers who study, teach about, and develop information technology.»[92]

This movement by employees resulted in the termination of project Maven. According to the 2019 PAX for Peace report *Don't Be Evil* it also led to;

> [The] company installing a policy committing to not design or deploy AI in weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people.[93]

It is clear that this move by employees impacted the company's decisions moving forward. Google Cloud CEO Diane Green stated that; «Google would not choose to pursue Maven today because the backlash has been terrible for the company.»[94]

It is important for experts to form a consensus in regard to what is considered moral and ethical in their field. However it is also important that those with the allocated authority listen and support their position.

In Australia AI researchers presented an Open Letter to then Prime Minister Malcolm Turnbull voicing their concerns and urging the Government to support an *International Ban on the Weaponization of Artificial Intelligence (AI)*. The letter was initiated by leading AI researcher Professor Toby Walsh of University of New South Wales Sydney. It stated;

> Lethal autonomous weapons systems that remove meaningful human control from determining the legitimacy of targets and deploying lethal force sit on the wrong side of a clear moral line.[95]

And that they urge the government to;

> Take a strong and leading position against Autonomous Weapon Systems on the international stage at the upcoming November 2017 CCW meetings at the United Nations.[96]

A response was issued by the then Foreign Affairs Minister Julie Bishop who stated;

> The government considers it would be premature to support a pre-emptive ban on autonomous weapons systems.[97]

The government failed to heed the call of Australia's leading AI researchers. The expertise and concerns of this industry need to inform policy decisions.

In 2018 the *Lethal Autonomous Weapons Pledge* was released at the International Joint Conference on Artificial Intelligence held in Stockholm. Signatories of the pledge include;

> Tesla and SpaceX CEO Elon Musk, Google DeepMind, ClearPath Robotics/OTTO Motors, the European Association for AI and the XPRIZE Foundation.[98]

These signatures come from 90 different countries.

President of the Future of Life Institute, who was a major organiser of the pledge, Max Tegmark stated that;

> AI has huge potential to help the world – if we stigmatise and prevent its abuse. AI weapons that autonomously decide to kill people are as disgusting and destabilising as bioweapons, and should be dealt with in the same way.[99]

The fact that warnings about the advancement of this technology are coming directly from the experts who have the potential to create it should be the first sign to halt production until a clear international agreement is implemented. However it does not appear that this will be the case. Due to this, it is clear that individuals and companies will have to step up and fill the void.

It is important that individuals continue to question and oppose the development of technology that they believe crosses the moral line.

It is also crucial that companies develop policy and procedure that restricts their contribution to unlawful technology such as fully autonomous weapons. This does not mean that companies need to cease their involvement with defence but rather that they take some individual responsibility for what the technology will be used for.

Through these two incentives, the individual and company can ensure that they uphold an international moral and legal standing.

Below: Global Campaign Meeting 2019, Berlin photograph by Ralf Schlesener

CIVIL SOCIETY AND THE CAMPAIGN TO STOP KILLER ROBOTS

Earlier chapters of this report have highlighted civil society's mobilisation around this issue. From the pledge from tech companies, tech workers and researchers across the globe to the open letter by AI researchers in Australia led by Professor Toby Walsh, technical experts are continuing to raise concerns over the development of fully autonomous weapons.

Academics and organisations pointed to the emergence of autonomous weapons as problematic as early as 2008. The Campaign to Stop Killer Robots formed in 2012 and is now active in 66 countries with over 160 member organisations. All of these organisations work in global and national settings advocating for a ban on fully autonomous weapons. The Campaign and all its members identify a treaty to be the only way to adequately address these weapons.

Whilst international apparatus and diplomatic actors provide the necessary platform for the creation of new international law, public awareness and education are also vital as the world grapples with the rise of AI broadly and in particular the questions of maintaining human control over lethal decisions or the use of force. This is an issue for society and is why many sectors of the community are engaged in conversations. This includes, among others, students, tech workers, academics of various disciplines, faith-based groups and gender-focused organisations.

Understanding the implications of such technology is important for users, creators, future workers (today's students) and society broadly. This is why as well as engaging with policy makers, parliamentarians and diplomats, the Campaign to Stop Killer Robots reaches out to broader groups through public seminars, panel discussions, roundtables and other similar events.

Although civil society had been expressing concerns around the development of fully autonomous weapons in Australia for many years, a coordinated campaign presence began only in 2019, launched by disarmament organisation SafeGround Inc (previously the International Campaign to Ban Landmines-Australia Network). The Campaign has commenced dialogue at all levels. Representatives have attended global campaign meetings, as well as the Group of Governmental Experts at the United Nations, and visited Parliament to brief politicians. The Campaign has organised events across the country including in Canberra, Sydney, Melbourne and Adelaide with various guest speakers and audiences. This report is another important tool for educating different sectors of society about this issue.

The Campaign to Stop Killer Robots in Australia will continue to call for the Australian government to support a ban on fully autonomous weapons and insist our defence apparatus place limits on the use of autonomy. Australia should lead in diplomatic processes as a positive global actor. Globally, the Campaign is urging states to launch negotiations for a treaty now, and will continue to do so with its diverse group, until fully autonomous weapons are banned.

Above: Matilda Byrne, National Coordinator Australia Campaign to Stop Killer Robots, speaking at a panel event hosted at Thinc Lab - University of Adelaide, March 2020.

CONCLUSION

Throughout this report, it has been established that fully autonomous weapons are defined by their ability to select and engage a target without meaningful human control. Removing meaningful human control from decision making over the use of lethal force is unlawful, immoral, unethical and poses threats to global stability.

Internationally, there is a broad agreement to discuss and address fully autonomous weapons. This is demonstrated throughout the statements and discussions of states at meetings of the United Nations (UN) such as the Convention on Conventional Weapons (CCW) and its dedicated Group of Governmental Experts (GGE) and the General Assembly as well as other multilateral meetings. Many states, organisations and individual experts, including those comprising the Campaign to Stop Killer Robots, advocate for a prohibition on the development and deployment of fully autonomous weapons. They have established that a pre-emptive ban is the only way to maintain meaningful human control and is the only sufficient decisive course of action.

The Australian government contends that a ban is premature and that these weapons need further research and considerations. Further, the Department of Defence is actively conducting development and collaborating on research in autonomy, and even explicitly fully autonomous weapons in some cases.

Defence has called upon private arms manufacturers to help expedite the process of acquiring this technology through partnerships in development and through the direct supply of unmanned technology.

The Government has also increased its support for advancements through partnerships with research institutions, in particular Australian Universities. Through federal and state funding, university departments are collaborating on work advancing autonomous technologies with defence.

The collaboration that stands out the most is Defence Cooperative Research Centre Trusted Autonomous Systems which has also been driving recent discussions about the ethics and limits of AI use in defence, but will not rule out developing these weapons.

The Australian tech sector is another crucial community when considering these weapons. Although companies and workers innovate many positive technological advancements there are no policies or procedures in place to hinder the possible contribution to weapon systems. This is a grave concern for said experts and the international community. The concerns of these experts must be heeded as they call for a ban on fully autonomous weapons.

In the absence of a legal instrument, growth in these sectors should be rigorously monitored and there should be an implementation of policy and procedure that restricts technology being researched or used, whether by universities, companies, arms manufacturers or Australian defence, to ensure they are not being used for the development of fully autonomous weapons.

All the relevant sectors are encouraged to do their part to ensure there are no advancements toward fully autonomous weapons as we wait for the international community to negotiate a new treaty.

As a member of the Campaign to Stop Killer Robots, we urge the Australian Government to take moral leadership, be a responsible global actor, support and actively work towards a pre-emptive ban on fully autonomous weapons.

Above: Australian organisations and peace groups come together on the lawns of Parliament House calling on politicians to take a stand against fully autonomous weapons, February 2020, Canberra

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For a visual presentation of some of these defence industry links between universities, Department of Defence and particular institutes, initiatives, research centres and individuals see https://littlesis.org/maps/5330-universities-and-autonomy-development-with-defence?Links_and_relationships

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