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# DEATH BY ALGORITHM

Public opinion and the lethal autonomous weapons debate

Author: Sophie Hale  
Supervisor: Nikolaos Myridis

## **ABSTRACT:**

Lethal Autonomous Weapons Systems (LAWS), branded “killer robots”, are expected to revolutionise warfare and have been the subject of hotly debated international discussions. Officially, they do not exist yet, but already the potential legal and ethical implications have led to calls for a ban on their development and use.

This thesis explores the current debates about LAWS and concludes that a pre-emptive ban is necessary to protect human rights and maintain global stability. The central question driving this study is “How can civil society engage the public on LAWS and gain support for an international ban on their development and use?”

In order to analyse this question, a public opinion survey was conducted to discover current levels of awareness of LAWS and attitudes towards their development and use among a Greek student sample. The results suggest that awareness of LAWS among the public is low. However, once provided with a definition of these weapons, most people opposed their development and use and supported a global ban. Moreover, the main reason cited for rejecting LAWS was that lethal decision-making should not be ceded to machines.

Based on these findings, some recommendations are made regarding strengthening public engagement in the debate.

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**TABLE OF ACRONYMS:**

AI - Artificial Intelligence

AWS - Autonomous Weapons Systems

CCW - Convention on Certain Conventional Weapons

DOD - Department of Defense

FLI - Future of Life Institute

GGE - Group of Governmental Experts

HRW - Human Rights Watch

ICRAC - International Committee for Robot Arms Control

ICRC - International Committee of the Red Cross

IHL - International humanitarian law

IHRC - International Human Rights Clinic

IHRL - International Human Rights Law

LAWS - Lethal Autonomous Weapons Systems

ORi - Open Roboethics institute

NGO - Non-Governmental Organisation

ROWS - Remotely Operated Weapons Systems

SIPRI - Stockholm International Peace Research Institute

UAV - Unmanned Aerial Vehicle

UCAV - Unmanned Combat Aerial Vehicle

UGV - Unmanned Ground Vehicle

UMS - Unmanned Military System

UN - United Nations

UNIDIR - United Nations Institute for Disarmament Research

UNOG - United Nations Office at Geneva

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## 1. Introduction

For decades, military technology has been evolving, utilising increasing levels of automation. Modern warfare has been transformed over the past 15 years by the expanded use of armed unmanned aerial vehicles (UAV), commonly known as “drones”. Drone strikes used extensively under the auspices of the global “War on Terror” have brought a slew of humanitarian and legal challenges to the international community’s attention. Now, rapid progress in Artificial Intelligence (AI) and robotics technology has led many experts to warn that fully autonomous weapons are an imminent possibility. These new weapons, branded “killer robots” by their detractors, represent a huge progression from current day armed drones and are widely acknowledged as a paradigm shift in warfare. Approximately 40 states are developing these autonomous weapons systems (AWS) that will be capable of identifying, selecting and engaging targets on their own, without any human intervention (Singer, 2009, p. 241). An open letter, written in 2015 by prominent AI and robotics researchers, described AWS as “the third revolution in warfare, after gunpowder and nuclear arms” and warned that their deployment was “feasible within years, not decades” (Future of Life Institute [FLI], 2015). Questions arose regarding the ethical and legal implications of these weapons systems, particularly their ability to comply with the rules of international humanitarian law (IHL) which governs conduct during armed conflict. Mounting pressure from civil society spurred the international community to begin discussions on AWS in 2014 within the framework of the United Nation’s Convention on Certain Conventional Weapons (CCW), the primary global level forum for approaching weapons issues. Consequently, informal expert meetings were held at the CCW annually until 2016, leading to the formalisation of the process the following year. While these discussions have been useful for developing a deeper understanding of the issues, a lack of political will and the inability to reach a consensus has hampered any tangible progress.

Meanwhile, concerns that fully autonomous weapons will be incompatible with international law, threaten human rights and fuel a global arms race have galvanised a broad spectrum of opposition into calling for a pre-emptive, legally-binding prohibition on their development and use. This movement, led by the Campaign to Stop Killer Robots, an international coalition of non-governmental organisations (NGOs), has declared that a ban on full autonomy in weapons systems is the only way to ensure that human rights are protected and international law is upheld. They fear that human dignity will be violated if life and death decision-making is delegated to machines, crossing “a fundamental moral line” (Campaign to Stop Killer Robots, 2018e). At the time of writing, 26 countries (Campaign to Stop Killer Robots, 2018c) have joined the Campaign’s call for a ban on killer robots and most parties

agree on the need to maintain meaningful human control over lethal decision-making, but with opposition from powerful states like the US, the UK and Russia, securing new international law limiting AWS seems far from certain.

This study argues that such a prohibition on fully autonomous weapons is necessary to protect human rights and uphold IHL, among other reasons. It highlights the importance of civil society in achieving this outcome given the inability of states to reach an agreement and examines the role of public opinion in shaping the debate on AWS.

### **1.1. Objective, Research questions and hypotheses**

Against this background, the thesis examines the contemporary international debates regarding lethal autonomous weapons systems (LAWS), focusing on the efforts of civil society to work towards a legally-binding prohibition on their development and use. The thesis is guided by the following main research question: “How can civil society increase public awareness of LAWS and gain support for an international ban on their development and use?”

Through analysis of the relevant literature and previous successful humanitarian disarmament campaigns, the study posits that the area where civil society can maximise its influence and increase support for a ban is public engagement. In order to answer the main research question, the study aims to identify the current levels of public awareness and attitudes about LAWS through conducting an exploratory public opinion survey of a population that has not been polled previously on the issue. The intention is to identify trends, compare them with previous studies on public opinion of LAWS and based on the results, make recommendations as to how the civil society movement can strengthen its approach to engaging the public at this critical time. The results of the public opinion survey were analysed through several hypotheses, which can be found in Chapter 5.

In order to answer the main research question, the foundations are first laid through exploring the following sub-questions:

1. Should the development and use of LAWS be pre-emptively prohibited?
2. Is a timely diplomatic solution to the LAWS debate likely?
3. How can civil society best work towards achieving a ban?

The first question acknowledges the unique characteristics of LAWS, such as the speculative nature of the technology, the difficulties in defining full autonomy in machines and



the challenges presented in debating this complex topic. The study will consider alternate concepts of autonomy, the state of the art and recent developments in technology. Moreover, the current legal, ethical and security debates regarding LAWS will be explored through conducting a critical examination of the existing research and literature with the aim of developing a comprehensive understanding of the potential implications of these new weapons.

The second question highlights the obstacles present in the diplomatic process of achieving prohibition of fully autonomous weapons as well as the slow pace often associated with such discussions. Answering the question involves examining the challenges and differing approaches produced in the CCW discussions on LAWS.

The third question directs the study towards the particular role that civil society plays in international disarmament processes. It focuses on the Campaign to Stop Killer Robots and highlights the barriers that exist to achieving a ban on LAWS. In order to answer this question, previous successful weapons bans are analysed to identify the criteria necessary for prohibition and then applied to the LAWS situation. This leads to the conclusion that civil society should focus on public opinion as a means to build support for a ban.

## **1.2. Relevance of this Research**

This section explains the relevance of this subject, highlighting the importance of public engagement with the LAWS debate and outlining why it is a critical time for research in this area.

### **1.2.1. A critical time for limiting LAWS**

“...the window is definitely closing. If we don’t pull this off in the next two years, we’ll be in trouble” (M. Wareham, personal communication, May 7, 2018).

The development of the technology underpinning fully autonomous weapons systems is progressing rapidly and could be ready in a matter of years. Presently, only precursor systems with limited levels of automation and demonstration models exist.<sup>1</sup> Many parties stress the importance of agreeing on limitations on full autonomy in weapons before the technology becomes available. They fear that once states possess such powerful weapons, they will be unwilling to accept restrictions on their use (Human Rights Watch [HRW] & Harvard Law School’s International Human Rights Clinic [IHRC], 2013). This is a critical time for those working towards a ban on AWS. In March 2018, the Campaign challenged states to conclude a

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<sup>1</sup> See Chapter 2 for a fuller discussion of precursor technology.

legally-binding instrument prohibiting the development, production and use of AWS by the end of 2019 (Campaign to Stop Killer Robots, 2018d).

Thus far, discussions about the advantages and dangers of LAWS have mostly remained confined to a relatively small community of experts, politicians and activists. However, with the impact of these weapons expected to be far-reaching, a wider conversation that includes the general public is demanded. One of the criteria often associated with achieving successful weapons bans is strong public support for prohibition and concern about the weapon's use. (Crootof, 2015b). In order to facilitate engagement and gain widespread support for prohibition, it is first necessary for the public to be aware of the issue. The relevance of this research is that it provides insights into current levels of awareness and attitudes about LAWS among the general public.

### **1.2.2. Why focus on public awareness and opinions about LAWS?**

Although many areas of importance are involved in the LAWS debate, this study focuses on public awareness and opinions about the new technology. Much of the literature related to the ability of LAWS to comply with international law has focussed on whether these weapons might violate the Martens Clause, which stipulates that during armed conflict "the human person remains under the protection of the principles of humanity and the dictates of the public conscience" (ICRC, 1977, Art. 1). This has been taken by many to mean that it is required under international law to engage the public on what is permissible during armed conflict, including which new technologies should be used. Consequently, for legal and ethical reasons, as well as to uphold democratic values, it is crucial that the public is engaged in discussion about the development of this new technology and how it should be used, if indeed it should be deployed at all.

### **1.2.3. Knowledge Gap**

Over the last few years, a limited number of public opinion polls regarding LAWS have been undertaken seeking to discover public attitudes towards the development and use of these new weapons (Carpenter, 2013; Horowitz, 2016; Ipsos, 2017; Open Roboethics initiative [ORi], 2015). These opinion polls have suggested that there is significant opposition to fully autonomous weapons systems among the public. However, sample sizes have been limited, there has been little research outside of the Anglophone world and many of the studies are a few years old now, which is problematic for a rapidly evolving issue such as LAWS. Two global studies have been carried out. The Open Roboethics initiative (2015) conducted a global

online survey of public opinion that was translated into 14 different languages but they did not publish their results in any academic journal and the sample size for most countries was too limited to draw substantive conclusions. More recently, an Ipsos (2017) global online poll surveyed 11,500 adults from 25 different countries on their support for using AWS in war. However, as that study only asked one question it lacked real depth.

Nevertheless, despite their limitations, these earlier studies revealed trends about the public's attitudes towards fully autonomous weapons that warrant further exploration to satisfy ethical and legal requirements. Furthermore, research about the current levels of awareness of LAWS among the general public is lacking. Moreover, though several studies gathered data on attitudes towards the development and use of LAWS, the author of this thesis is not aware of any previous research documenting the sentiments of Greek people towards LAWS.

Therefore, the knowledge gap is threefold in that insight is lacking on 1) current levels of awareness of autonomous weapons among the general public, 2) contemporary attitudes towards the development and use of LAWS and 3) which issues the public prioritises concerning LAWS.

Additional research is needed to test current public opinions about LAWS, discover which concerns people prioritise and evaluate potential levels of support for a ban. The survey produced for this thesis is conducted in Greek, which to the author's knowledge has not been done before, and utilises a sample that has not been documented before, namely Greek students. Therefore, this study contributes to the existing body of research into public opinion on LAWS since it provides insights into the attitudes of a different population compared to earlier studies. Moreover, unlike earlier research, this survey also tests for levels of awareness of LAWS and seeks to identify which LAWS related issues people prioritise with a view to targeting those concerns to strengthen future public engagement.

### **1.3. Research Approach**

Several major research enquiry paradigms exist, each with distinct ontological, epistemological and methodological characteristics. Guba and Lincoln (1994) divided these paradigms into four groups; positivism and its more recent variant, post-positivism, critical theory and constructivism. The philosophical assumptions underpinning this research mainly originate from the post-positivist tradition. This implies an objective epistemology and the ontological belief that reality is assumed to exist but can only be apprehended imperfectly and probabilistically (Robson, 2002, p. 624) due to "basically flawed human intellectual

mechanisms and the fundamentally intractable nature of phenomena” (Guba, & Lincoln, 1994, p. 110).

The research strategy utilised for this thesis is combines elements of qualitative and quantitative techniques. Quantitative studies are often seen as useful for confirming hypotheses about phenomena and gaining quantifiable, measurable results (Burns, 2000, pp. 9-10). Alternatively, the strengths of qualitative research lie in its potential to gain more in-depth knowledge of a phenomenon, capturing greater complexity to arrive at more holistic, but less generalisable results (Burns, 2000, pp. 13-14). In the case of this study, the author decided to take an interdisciplinary approach. This was inspired by the multifaceted nature of the LAWS debate. The research methodology is mainly quantitative in nature, with a survey as the main method of data collection. However, this was supplemented by a short questionnaire and an interview which were more qualitative as they allowed for less structured responses. Information gained from the questionnaire, interview and literature review was used to inform the design of the final quantitative survey. It was the belief of the author that this mixed method approach would be the most pragmatic way to explore this study’s research question.

The short questionnaire was sent out first, by email, to organisations involved in the Campaign to Stop Killer Robots. This was followed by a survey of students to gain some insight into current levels of public awareness and feelings about the development and use of LAWS in Greece.

### **1.3.1. Questionnaire and Interview with Campaign NGOs**

In order to fully explore the central research question and better understand current barriers to achieving an international ban on LAWS, it seemed essential to consult with people directly involved in the Campaign. A short questionnaire comprised of four open-ended questions was sent to key actors by email. These insights were used throughout this thesis, to inform and add depth to the discussion.

Respondents were asked what they believed to be the greatest challenge to achieving new international law prohibiting LAWS and what they felt was the current level of public awareness on the subject. They were also asked what they had found to be the main challenges in raising public awareness and gaining support for a ban. Finally, respondents were asked what they had found to be the public’s biggest concern regarding AWS based on their experience working with the Campaign. The purpose of these questions was to gain primary data that would provide different perspectives on the research question. The information gathered also

informed the construction of the main study, the public opinion survey. The expert questionnaire was not aiming to be representative, but to be a way to understand how individuals involved in the Campaign experienced and interpreted events.

One respondent preferred to conduct a Skype interview rather than respond by email. This interview took around 40 minutes and resulted in much more detailed information being gathered, with the questions becoming less structured in nature. In total seven organisations and individuals involved with the campaign answered the questions, six answering by email and one by Skype interview. All participants were offered the chance to remain anonymous but none chose to do so.<sup>2</sup> All individuals and organisations contacted were selected because they were listed on the Campaign's website as spokespersons for their country or their area of expertise.<sup>3</sup> Not all those listed were approached. Contact was limited to those that spoke English and to one representative per organisation.

### **1.3.2. Public opinion survey**

The main research component of this thesis is a public opinion survey. It was translated into Greek and specifically targeted Greek speaking students at Aristotle University where the author was based during the research period. It sought to discover students' level of awareness and feelings about the development and use of LAWS and generated primary data on the topic. The survey was administered using an online platform and a paper format. The online survey ran for 17 days from 16 May 2018 to 1 June 2018. In total, there were 120 responses to the final study; 74 from the online survey and 46 from the paper version. The full methodology of this survey can be found in Chapter 5.

### **1.3.3. Research ethics**

It is crucial in all forms of research to consider ethical issues. The principle of non-maleficence, or "do no harm", is "held as a guiding precept" (Cohen, Manion, & Morrison, 2007, p. 58) in medicine and beyond. Although this study does not appear highly sensitive, it still inquires after the personal views and value judgements of those involved, including the individuals working with the Campaign who answered the questionnaire and the students who completed the survey. The students also completed demographic and personal data about their military background which could be viewed as sensitive. To mitigate the chance of doing harm, individuals from the Campaign were offered anonymity if they did not want to be identified,

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<sup>2</sup> A list of all those who took part and the questions that they were asked can be found in Appendix C.

<sup>3</sup> The names of individuals and NGOs involved in the Campaign were found at:

<https://www.stopkillerrobots.org/spokespersons/> Email addresses were found using internet searches.

though none chose that option. The survey of students was anonymous, with no personally identifiable data collected and participation was voluntary.

#### **1.4. Thesis structure**

The thesis begins with two chapters that review the key technological issues and current debates about LAWS, including their ethical and legal permissibility. The argument for a pre-emptive ban on the development and use of LAWS will be based on these discussions. The fourth chapter focuses on the international political situation and outlines the role of civil society in achieving prohibition on LAWS.

Chapter five details the methodology of the public opinion survey conducted for this thesis, followed by a chapter analysing the results, centred on the four hypotheses. This work concludes with recommendations for increasing public engagement on LAWS based on key trends identified by the study, as well as suggestions for further research in this area.

#### **1.5. Scope and Delimitations**

As stated in the research question, the central focus of this study is the role of civil society and public engagement in achieving prohibition of LAWS. Therefore, it is not intended to be an exhaustive examination of all the technological aspects of these highly complex systems which do not yet exist, nor is it a legal analysis or philosophical work. Furthermore, this thesis will not attempt to prove or disprove the feasibility of a ban on LAWS nor will it outline ways that such a prohibition could be implemented and verified. These are complex arms control issues that are beyond the scope of this research.

The public opinion survey is subject to certain limitations. Due to limited resources, the study will only be focussed on Greek students and will not be extended to a representative sample of the population of Greece. It is envisioned as an exploratory study that can form the basis of further research and add to the existing body of knowledge. A fuller discussion of the methodological limitations will be discussed in chapter five.

## 2. Technological contexts of LAWS

The following section gives an overview of the background of LAWS including different conceptions of autonomy in machines, the technical aspects, and the state of the art in autonomous weaponry.

### 2.1. Current definitions and concepts of autonomy

Ever increasing autonomy in weapons systems, particularly in relation to selecting and engaging human targets, challenges existing conceptions of human responsibilities in warfare like never before. However, the exact nature of machine autonomy is disputed and varies depending on the discipline and approach being used.

The search for a widely accepted definition of what constitutes LAWS has been a major obstacle to moving forward with international discussions around their potential development and use. Presently, there is no single agreed upon definition of what constitutes LAWS. This is partly because they do not exist yet so any definition is speculative. However, it is also due to difficulties in measuring and defining autonomy in machines as well as a lack of agreement around where and to what extent human involvement is required for systems to be classed as less than fully autonomous. Currently, the academic and political literature about LAWS contains several different approaches to defining autonomy with varying criteria and terminology. These differing concepts of autonomy and automation will be examined next and the favoured positions of the key players will be briefly discussed.

Defining true autonomy in machines has proven extremely difficult. In fact, some experts have argued that labelling machines as autonomous is “maladaptive” (Jansson, & Stensson, 2014, p. 455) as they cannot possess the qualities required for such a state. For example, technology cannot exercise free will, as it is always controlled, or at least directed at a certain point by a human, its actions constrained by its programming and algorithms. Moreover, it cannot be attributed with responsibility for its actions, a prerequisite for moral autonomy under Kantian philosophy (Kant, 1785). Therefore, these academics conclude that it is impossible for technology to be autonomous. Nevertheless, as Geiss (2015) among others has argued, this is an unhelpful oversimplification when studying LAWS. He agrees that machines cannot possess autonomy in the individual, philosophical sense because there will always be a human involved in the decision-making process at some point. However, he counters that meaningful human control cannot be claimed when the decision to use lethal force is taken before the system is deployed to a potentially complex, unpredictable battlefield environment (p. 6).

Notwithstanding such philosophical arguments, further obstacles to defining autonomy arise as to the level at which a weapons system could be considered “autonomous”. Several experts have described a continuum of autonomy (Lawand, 2013), starting with basic automated systems, many of which have been in use for decades, such as robotic arms used in manufacturing (Boulanin, & Verbruggen, 2017, p. 6) or tripwires and landmines (Crootof, 2015a, p.101) as the simplest examples of automated weapons. These automated systems follow pre-programmed commands in a predictable manner and are incapable of independent reactions to unforeseen situations (Geiss, 2015, p. 6). The fully autonomous weapons systems which are causing international concern would fall at the far end of this spectrum of autonomy. However, it may not always be possible to make a precise distinction between automated and autonomous systems, especially as they become more complex. For example, a land-based anti-missile system currently in use called C-RAM (Counter Rocket, Artillery and Mortar), is programmed to identify selected rocket and mortar signatures and then destroy the incoming objects that match them. Though this system can be supervised by a human operator, once engaged it will destroy without further human involvement, utilising its ability to respond faster than any human could (United Nations Institute for Disarmament Research [UNIDIR], 2017b). Hence, increasingly complex weapons systems already blur the line between autonomous and automated systems, problematising the search for a definition.

Despite these issues of distinction, there exist several models and approaches to describing autonomy in weapons systems that have been used in the international debate. Scharre (2015) proposes categorising these approaches into three groups:

1. The human-machine command-and-control relationship, which grades autonomy based on the level of human involvement in the given task;
2. the sophistication of the machine’s decision-making process, which defines levels of autonomy by a system’s technical capabilities; and
3. the types of decisions or functions being made autonomously (p. 9).

This method is also embraced by Boulanin & Verbruggen (2017) in their report mapping the development of autonomy in weapon systems, produced for the Stockholm International Peace Research Institute (SIPRI).

The first group of definitions focuses on the degree of human involvement in the actions of a system and includes that of the US Department of Defense (DOD), which describes AWS as:



A weapon system that, once activated, can select and engage targets without further intervention by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation (2012, p. 13-14).

This group also covers two influential, step-based models. The first is Human Rights Watch's (HRW) widely used, three-step approach to defining autonomy in unmanned "robotic weapons" (2012). Their definition is divided into the following categories:

- 'Human-in-the-Loop' systems are only able to select targets and use force with a human command;
- 'Human-on-the-Loop' systems are capable of selecting targets and using force but are monitored by a human operator who can override the system's actions; and
- 'Human-out-of-the-Loop' systems which can select targets and deliver force without any human input or interaction. (p.2)

'Human-in-the-loop' systems are not autonomous and need human guidance to operate. A current example of these systems is remote-controlled drones, also known as Unmanned Combat Aerial Vehicles (UCAV), that have been used by the USA to carry out targeted attacks in Afghanistan, Pakistan and Yemen (Geiss, 2015, p. 7). HRW classifies both of the other two categories of unmanned weapons as autonomous, arguing that even though a human may be 'on-the-loop', the level of supervision could be so limited that they effectively function as 'out-of-the-loop' systems. This view is supported by Christof Heyns (2013), the former United Nations Special Rapporteur on extrajudicial, summary, or arbitrary executions, who explained that the option for a human to override a lethal decision may be almost impossible when the system is capable of taking decisions in a matter of nanoseconds. Realistically then, there is no meaningful human control over this supervised-autonomous system so it is effectively fully autonomous (p. 8).

The second step-based model focussing on the level of human control was developed by Noel Sharkey (2016), a professor of AI and robotics and chair of the International Committee for Robot Arms Control (ICRAC). He outlines five levels rather than just three:

1. A human selects the target and initiates any attack;
2. A computer program provides alternative targets and a human selects which one to attack;
3. A program selects the target and a human must give approval before the attack is executed;
4. A program selects the target and a human has a limited time to override an attack; and
5. A program selects the target and initiates the attack without any human involvement (p. 35-36).

Both HRW's three-step model and Sharkey's five-step categorisation focus on the level of human involvement in a system's actions to define autonomy, but as Geiss highlights, it is difficult to make clear distinctions between each level. Moreover, as both Geiss and Sharkey, among others, have emphasised, even if humans continue to supervise the decision to use force, the chances of the operator deferring to the recommendations of the machine, especially in stressful, time-sensitive situations, are extremely high. This tendency to trust in the machine without seeking further evidence is known as "automation bias" and would negate the desired effects of human control (Sharkey, 2016, p. 45-46; Geiss, 2015, p. 7).

The second set of definitions centre on a system's technical capabilities. This includes Canada's statement that "*autonomy* is a subjective assessment of a robot's capabilities given the demands of mission, environment, and mechanical system" (Government of Canada, 2016). It also encompasses the UK's position that a fully autonomous weapon would be "capable of understanding, interpreting and applying higher level intent and direction based on a precise understanding and appreciation of what a commander intends to do" and to choose and complete actions without human oversight, though this might still be present (Statement of the UK, 2016). The UK has been criticised for its use of this definition by the NGO Article 36. They accuse the UK of failing "to engage substantively on the concerns surrounding those weapons systems already on the cusp of development" because its "narrow and futuristic definition" requires AWS to be so sophisticated that they are not technologically achievable yet and may never be (Article 36, 2017).

Finally, some players such as the US Defense Science Board (Scharre, 2015, p. 8) and the International Committee of the Red Cross (ICRC) have concluded that technical distinctions that focus on levels of autonomy are unhelpful as they are too difficult to quantify, so they have

instead focussed on autonomy in specific parts of a weapons system, such as in its functions or decisions. This “situated approach” (Boulainin, & Verbruggen, 2017, p.7) to the concept of autonomy is also favoured by Williams (2015) who recommends “replacing the widely used but ambiguous term ‘autonomous system’ with the more specific ‘system with autonomous functions’” (p. 27). These concepts constitute the final group of definitions outlined by Scharre and tend to focus on autonomy in tasks related to the use of force, rather than other functions, such as those associated with mobility or self-repair. For example, the ICRC (2016) defines an AWS as:

[a]ny weapon system with autonomy in its critical functions. That is, a weapon system that can select (i.e. search for or detect, identify, track, select) and attack (i.e. use force against, neutralize, damage or destroy) targets without human intervention.

Therefore, LAWS are systems that perform the targeting and engagement process after initial activation, reacting to stimuli in the given environment rather than being supervised or merely following a pre-programmed set of human commands. The Dutch NGO PAX, a cofounder of the Campaign to Stop Killer Robots, also defines AWS as systems that “once activated, using sensors and/or artificial intelligence, will be able to operate without meaningful human control over the critical functions” (Slijper, 2018, p. 6). Likewise, Switzerland finds that AWS are systems that have “autonomy in the targeting cycle where a machine makes the targeting determination and fires without human interaction” though they do not limit their definition to only lethal force or targeting (Campaign to Stop Killer Robots, 2016b).

Since this thesis will focus on the Campaign to Stop Killer Robots, it will apply the model used by them, which is based on HRW’s three-step model as applied to the targeting process.<sup>4</sup> The Campaign often refers to LAWS as “killer robots”. However, this paper will refer to LAWS or AWS because the term “robot” often conjures up an anthropomorphic image more in line with the idea of “The Terminator” which could be misleading. As Heyns (2013) explains, “sentient robots, or strong artificial intelligence are not currently in the picture” (p. 8).

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<sup>4</sup> The Campaign states that they seek to “to prohibit taking a human out-of-the-loop with respect to targeting and attack decisions.” (Campaign to Stop Killer Robots, 2018a)

## **2.2. The State of the Art in LAWS**

Although it is generally accepted that fully autonomous weapons systems do not exist yet,<sup>5</sup> many states and private companies are developing increasingly independent systems and that research is proceeding at a high pace. From the proliferation of companies testing self-driving cars (Wade, 2018) to rapid developments in drone technology (Berntsen et al., 2017), there is a trend towards increasing automation and autonomy in systems across the civil and military sectors.

The next section examines recent advances in technology that have fuelled these developments. It also illustrates the current state of the art in LAWS by outlining examples of weapons systems with some level of autonomy in their critical functions that are presently deployed or under development.

### **2.2.1. Recent developments in technology**

Recently, major advances in AI and robotics have generated a great deal of media coverage (Mone, 2017; Knight, 2017a) and contributed to concerns that LAWS may soon become a reality. In August 2017, Tesla's CEO Elon Musk led a group of 116 prominent experts in the fields of AI and robotics, calling on the UN to ban the development and deployment of autonomous weapons and warning of the danger of a "third revolution in warfare" if international laws and treaties are not updated to ameliorate the risks of these new technologies (FLI, 2017; Gibbs, 2017). In order to understand the current state of the art in AWS and better predict the speed of their evolution, it may be useful to first outline the underlying technology then explain reasons behind the recent surge in progress.

From a purely technical standpoint, Boulanin and Verbruggen (2017) conclude that "autonomy derives...from the ability of a system to sense and act upon an environment and direct its activity towards achieving a given goal" (p.11). They explain that the underlying technology that allows systems to interact and engage with their environment may be comprised of different components in different systems, but the architecture is basically the same. It is composed of sensors to gather data, computer software and hardware to interpret that data and convert it into actions, communication technology to interact with other agents, be they human or machine, and actuators and end effectors to execute actions in the given

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<sup>5</sup> The ICRC states that "'fully' autonomous weapons are still only in the research phase and have not yet been developed, even less so deployed in armed conflict" (Lawand, 2013). This view has also been expressed by states at the CCW meetings and accepted by NATO among others (Berntsen, Dyndal, & Redse-Johansen, 2017).

environment. They highlight that computer software is the key to autonomy and currently the most critical aspect as well as the least developed (Boulainin and Verbruggen, 2017, p. 12).

However, both computer software and AI techniques have progressed immensely within this decade. Machine learning is a software development method that allows computer systems to “learn” by finding statistical relationships in data. This improves their performance at a set task without the need for algorithms to be explicitly programmed by a human (Brunelli, Strum, & Yomtoubian, n.d., p. 3), saving time and labour compared to traditional programming methods. Machine learning, and its subset, deep learning,<sup>6</sup> has actually been around since the 1950s. However, it has only been within the last few years, especially since 2015, that breakthroughs in GPU computational power, access to almost infinite data storage and the advent of “Big Data” have unlocked the potential of these AI approaches (Copeland, n.d.). These techniques, particularly deep learning, require access to a huge volume of real world examples to train their algorithms and improve their accuracy (The Royal Society, 2017, p.48). These approaches to computer learning have enabled huge leaps forward in computer vision and image classification. This is highly significant for the development of autonomy in LAWS as it creates opportunities for improvement in all areas, but especially in target identification (Knight, 2017b). The US military is reportedly “developing countless autonomous systems that will undoubtedly rely heavily on machine-learning techniques like deep learning. Self-driving vehicles, along with aerial drones, will increasingly be used in coming years...and they will become increasingly capable (Knight, 2017c).

However, machine learning systems can become extremely complex, processing incredible amounts of data, making it very difficult for humans to understand why the system has reached its final output. This can lead to challenges in predictability and reliability, one of the key technical concerns surrounding the future deployment LAWS (UNIDIR, 2017b, p.13).

### **2.2.2. Current state of the art**

As already stated, fully autonomous weapons systems do not exist yet. Opinion is divided among the scientific community as to when the technology will be ready. HRW in their 2012 report ‘Losing Humanity’ claimed that experts estimated LAWS “could be developed within 20 to 30 years” (HRW, 2012, p.2).

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<sup>6</sup>Deep learning is a form of supervised machine learning and is “a specific technique based on neural networks, which draws heavily on knowledge of the human brain, statistics, and applied maths.” It works by layering simple concepts to create a complex concept (Boulainin and Verbruggen, 2017, p. 17).

The following example highlights just how difficult it is to speculate about the timeline of this technology's evolution. HRW (2012) highlighted that, in 2011 the UK Ministry of Defence predicted fully autonomous swarms of drones might be available by 2025 (p. 8). However, in October 2016, the US military tested a system of autonomous mini-drones, nine years earlier than had been predicted. The swarm, comprised of 103 miniature Perdix drones, once launched, operated completely without human involvement (Department of Defense [DOD], 2017). The drones function as a collective organism with a shared, distributed brain for making decisions, and the ability to adapt to the loss of individual drones while maintaining formation (Baraniuk, 2017). Officially planned for surveillance and intelligence gathering, the test "illustrates how military planners are attempting to move away from large, expensive weapon systems to smaller, inexpensive autonomous systems" (Leopold, 2017).

Furthermore, many governments have been increasing their spending on research and development of unmanned weapons systems, particularly UCAVs in the last few years, reinforcing HRW's (2012) claim that the trend is moving towards militaries being increasingly unmanned in the future (p. 6). For example, in 2018 "the U.S. military's spending on drones is set to reach a five-year high" (Gettinger, 2017, p. 1) with increases in spending on research and development and plans for creating new unmanned ground and naval vehicles, as well as "the next generation" (Gettinger, 2017, p. 12) of unmanned military systems (UMS).

Several systems capable of varying levels of autonomy in their critical functions already exist or are in the final stages of production and have been described as precursors to fully autonomous weapons (HRW, 2012, pp. 9-20; Slijper, 2018; Heyns, 2013, pp. 8-9). A few prominent examples are described below for illustration. It should be noted however, that this is not an exhaustive list, particularly in light of the secrecy that surrounds weapons development.

- Automated defensive systems have been around for decades and are deployed globally. Examples include the US "**Phalanx CIWS**" short-range ship protection system, in use since the 1970's, as well as more recent equivalent land-based systems, most notably Israel's anti-missile system "**Iron Dome**". These systems autonomously sense, detect and destroy incoming hostile objects, such as missiles, rockets, enemy aircraft or even ships, according to pre-programmed criteria set by a human operator. Generally, these systems do not have a "human-in-the-loop" due to the need for rapid response, with human participation limited to accepting or rejecting the system's plan of action in a very narrow timeframe (HRW, 2012, p. 9). HRW (2012) described these systems as "one step on the road to full autonomy" (p. 9).

- Several naval systems have been developed, including the USA's unmanned anti-submarine vessel, the "**Sea Hunter**", capable of considerable autonomy. Due to complete initial testing in 2018, the robotic warship can travel huge distances for months at a time without any crew onboard and "represents breakthroughs in autonomous navigation and human-machine collaboration that could change the nature of U.S. maritime operations" (Pellerin, 2016).
- On land, various unmanned ground vehicles (UGV) have been developed. For example, the Israeli "**Guardium**" system (Israel Aerospace Industries Ltd., n.d.a) reportedly patrols the border with Gaza, carrying out surveillance and combating intruders (Tarantola, 2012). Armoured and lightly armed for its own protection, it can be remotely-controlled but possesses an autonomous mode allowing it to work in a designated area for extended periods without human contact (Defense Update, 2008). South Korea has also delegated some of its border control duties to robotic systems. The Samsung "**SGR-A1**" is a robotic sentry gun deployed in the demilitarised zone between North and South Korea (Global Security, 2011). Using infrared sensors, it can identify, track and attack a target without human intervention, though currently humans are still 'in-the-loop' (Heyns, 2013, p. 9).
- The area that has seen the greatest progress in autonomy is unmanned aerial vehicles (UAV). UAVs have evolved from remote-controlled systems used mainly for reconnaissance to armed weapons platforms. The age of "killer drones" began in 2001 when the US upgraded its "**MQ-1 Predator**" drones to carry "**Hellfire**" missiles (Matthews, 2013) and began regularly using them "for the targeted killing of suspected terrorists" in countries such as Yemen, Afghanistan and Pakistan (Dickow, & Linnenkamp, 2012/2013, p. 1). Meanwhile, many countries have incorporated UAVs into their armed forces, including Germany, the UK, and Israel (Dickow, & Linnenkamp, 2012/2013, p. 1), and significant developments have been made in UAV technology, with ever greater autonomy being achieved in systems currently under testing. These demonstration models combine higher speeds, integrated weapon bays, improved command and control functions and advanced sensor systems. For example, the US Navy's "**MQ-8C Fire Scout**" is a helicopter system that can take-off and land autonomously that is currently being tested (Naval Technology, n.d.). Also, BAE Systems "**Taranis**" being developed by the UK and the French-led European program, the experimental "**nEUROn**" system (Dassault Aviation, 2015), are comparable unmanned jet-propelled stealth demonstration models capable of mounting attacks in

hostile territory using autonomous targeting while remaining undetected. Both systems have been flown but are apparently only intended for demonstration purposes. BAE stress that their UCAV will be “under the control of a human operator” (BAE Systems, n.d.) though some media sources have reported that they were “proceeding on the basis that an autonomous strike capability could be required in the future” (Cole, 2016). In 2014, plans were announced to combine both systems leading to a “**Future Offensive Air System**” that will be “the most advanced of its kind in Europe” (Allison, 2018). Finally, the Northrop Grumman “**X-47B**”, being tested by the US Navy, is another jet-powered unmanned fighter. Capable of airborne refuelling, autonomous navigation and the ability to autonomously launch and land on aircraft carriers, the “**X-47B**” made history in 2013 as the first UAV to perform a successful autonomous carrier landing (Northrop Grumman, n.d.).

- Finally, loitering munitions are another class of semi-autonomous drone, falling somewhere between a guided missile system and a UCAV. Unlike UCAVs they are expended on completion of their mission, attacking their targets by self-destructing. They can “loiter” in the air for extended periods, allowing the human operator time to decide on a strike (Slijper, 2018, p. 8). The Israeli “**Harop**” system is a key example, capable of autonomously identifying and destroying enemy targets, though it is claimed that attacks are conducted with a human “in-the-loop” to avoid mistakes (Israel Aerospace Industries Ltd, n.d.b).

These advanced systems can operate without direct human control and demonstrate what unmanned weapons systems could be capable of in a few years time. It appears that fully autonomous LAWS may not be a distant proposition. Indeed, renowned AI expert, Professor Stuart Russell of University of California, Berkeley, declared that:

[...] the use of autonomous weapons is a very real and imminent problem. The technology to build autonomous weapons...is already there. This is not science fiction. No new technological breakthroughs are required. It’s an engineering problem of integrating what we already know how to do. (Regards Connectés, 2018)



### 3. Current debates about LAWS

This chapter examines the current debates surrounding the development and use of LAWS, including the moral and ethical implications, discussions about their potential legal compliance and implications for human rights. The discussion will review the relevant literature and attempt to answer one of the sub-questions of this research: Should the development and use of LAWS be pre-emptively prohibited? This chapter will also benefit from the inclusion of insights gained from responses given by experts working within the Campaign.

The current debates about LAWS can be split into four main areas: legal, ethical, technological and peace and security. Nevertheless, many of the issues are cross-cutting, further demonstrating the multifaceted nature of this topic. There are numerous arguments both for and against developing and using AWS. Most of these arguments follow either consequentialist or deontological reasoning,<sup>7</sup> with widely divergent views expressed on both sides.

#### 3.1. Autonomous Weapons Systems and International Law

Thus far, the most heavily debated subject regarding LAWS is their ability to comply with the Laws of Armed Conflict (LOAC), particularly IHL and International Human Rights Law (IHRL). This body of customary and treaty laws governs the use of force during hostilities, including international and non-international armed conflicts, and codifies what society thinks of as acceptable battlefield behaviour (Lawand, 2006, p. 5). Many NGOs, lawyers, technology experts and several states, including Ecuador, Mexico, and Pakistan (Campaign to Stop Killer Robots, 2015, p. 9), believe that autonomous weapons would be unable to respect these laws, necessitating a pre-emptive ban on their development and use. However, proponents of LAWS, most notably the US (Statement of the USA, 2018), have argued that not only might LAWS be able to respect the LOAC, they may even be able to uphold it more effectively than human combatants. It is important to note that both states and civil society agree that it is essential that any future implementation of autonomous weapons must comply with international law. This has been recognised as fundamental since the first UN Informal Expert Meeting on LAWS back in 2014 (Simon-Michel, 2014, p. 5).

According to Article 36 of the first Additional Protocol to the Geneva Conventions (ICRC, 1977), signatory states must ensure that any new weapon will conform to IHL before its

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<sup>7</sup> For a thorough discussion of both approaches to the debate, see (Amoroso, & Tamburrini, 2017) and (Tamburrini, 2016).

development, acquisition or adoption. The importance and relevance of Article 36 to the LAWS debate has been stressed repeatedly, by states, experts, and NGOs alike (Boulanin, 2015, pp. 1-2). Although it is disputed whether Additional Protocol I applies to all actors in an armed conflict or only to signatory states, it is a fact that most weapons producing nations have accepted the obligation to review (HRW, 2012, p. 21). In order for new weapons to comply with IHL, they must conform to certain criteria and the review should begin with the weapon's inception and continue throughout the development process (HRW, 2012, p. 22). States must ascertain whether new weapons contravene existing treaties or customary law. These include the customary law principles of distinction, precaution, proportionality and military necessity, considered to be the cornerstones of IHL (Lawand, 2006, pp. 16-17). Using weapons deemed to cause superfluous injury or unnecessary suffering (ICRC, 1977, Art. 35) is prohibited under IHL too. States must also consider the Martens Clause, which states that new weapons must not run counter to "the principles of humanity" and the "dictates of the public conscience" (ICRC, 1977, Art. 1[2]). The Martens Clause acts as "a safety net for humanity" (ICRC, 2018, p. 6) since it provides customs, public conscience and humanity as criteria for assessing new methods of warfare, even if they do not violate existing laws or treaties. Some refute the applicability of the Martens Clause to the LAWS debate (HRW & IHRC, 2014, p. 15) or claim it is merely an ethical guideline rather than a legal requirement (Lawand, 2006, p. 6). However, HRW (2012) asserts that this clause "is a useful tool for evaluating and governing emerging weapons because they often develop faster than international law" (p. 26). Certainly, from the limited number of public opinion surveys undertaken to date, there appears to be significant opposition to the development and use of LAWS.<sup>8</sup> Although opinion polls alone cannot determine the dictates of the public conscience, they are an indicator that states should consider.

A core principle of IHL is that a distinction must be made between lawful and unlawful targets otherwise attacks are considered indiscriminate and illegal (ICRC, 1977, Art. 48, 51[2] & 52[2]). This means discriminating between active combatants and civilians or injured or surrendering soldiers, who are also protected from attacks through being "hors de combat" (ICRC, 1977, Art. 41). Proponents of LAWS, such as prominent roboticist Ronald Arkin, claim that these weapons could be programmed to obey IHL, including the principle of distinction (Arkin, 2009). His concept of a so-called "ethical governor" programme could even mean that LAWS would be more capable of upholding IHL than human soldiers because robotic

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<sup>8</sup> See for example (Carpenter, 2013; Ipsos, 2017; ORi, 2015). For a fuller discussion of this topic, refer to Chapter 4.

weapons, by their very nature, do not possess emotions. Without the burden of fear, fatigue or anger, LAWS would not be inclined to commit atrocities or war crimes. Furthermore, LAWS may lack the self-preservation drive of humans, allowing them to act more conservatively in the battlefield, taking longer to make lethal decisions and getting closer to their targets for greater precision (Singer, 2009, p. 398). Thus, it is argued that there would be a moral obligation to deploy such weapons if available as they could minimise civilian casualties. However, this consequentialist argument depends upon technology reaching this level of ability. Noel Sharkey (2012), another roboticist, criticises Arkin's ideas for relying on a "back-end system" dependent upon the development of "adequate sensory or vision processing systems" (pp. 787-788) at some point in the near future. Such advanced technology is not currently available, meaning Arkin's approach remains purely theoretical. Sharkey (2012) warns that machines could never reliably meet the principle of distinction. Peter Asaro, co-founder of ICRC, claims that the principle of distinction "will remain the most difficult theoretical and practical problem facing the development of such robots" (2008, p. 61). Other critics corroborate this, stating that correct attribution of intention in a complex battlefield situation is a difficult task for human soldiers, let alone for machines without recourse to emotions to help predict the internal states of others (Bello, & Guarini, 2012, p. 130). Both HRW (2012, p. 31) and Geiss (2015, p. 14) emphasise the difficulties of distinguishing combatants in modern conflicts which are often characterised by high levels of confusion and complexity, when combatants might seek to blend in with the civilian population by not wearing uniforms or insignia. This lack of physical identification could make the task of distinction impossible for machines and even allow insurgents or terrorists to fool LAWS by exploiting their sensor and programming limitations (Krishnan, 2009, p. 99).

IHL also prohibits disproportionate attacks, meaning when civilian harm outweighs military gains (ICRC, 1977, Art. 51[5b] & 57[2a.iii]). The proportionality test, described as "one of the most complex rules" (HRW, 2012, p. 32) of IHL, requires highly subjective, value-based judgements based on specific contexts (ICRC, 1987). Sharkey (2012) warns that LAWS will lack the situational awareness and agency required to make satisfactory decisions about proportionality (p. 789). As context is vital to making proportionate judgments and avoiding collateral damage, decisions about attacks need to be made on a case-by-case basis. HRW (2012) claims there is little possibility of developing LAWS able to process and interpret the high numbers of circumstances required for them to make proportionate decisions (p. 34). Arkin (2009) counters that due to LAWS presumed lack of a survival instinct, they would not be driven by fear into using excessive force, therefore complying with the principle of

proportionality more easily than humans might (p. 58). However, this does not solve the problem of planning and ordering attacks using subjective decision-making, and as already stated, it is not clear if the technology required for this will ever be developed (Geiss, 2015, p. 15; HRW, 2012, p. 31). Concerns that LAWS will be unable to comply with the principles of distinction and proportionality have led some to consider whether these weapons should only be used in environments that do not contain civilians, such as under the sea or in space (Scharre, 2014). However, critics contend that once states have access to such powerful weapons they will be tempted to use them more extensively, rendering this argument unhelpful (Geiss, 2015, p. 16).

The principle of precaution is closely linked to those of distinction and proportionality. It mandates that all feasible precautions must be taken to protect civilian populations and objects both before and during an attack (ICRC, 1977, Art. 57[1]). Any weapon that cannot meet this requirement would fail the Article 36 weapons review. This principle implies the obligation to maintain at least a “human-on-the-loop” for any AWS. Complex battlefields are subject to rapid changes and a legitimate target when an attack was planned and ordered may become off-limits by the time a weapons system arrives. A human supervisor could intervene, cancelling or modifying an attack if it was no longer lawful. However, due to the high processing and reaction speeds associated with computer-guided weapons, many have questioned if a soldier “on-the-loop” would really be capable of satisfactorily intervening during a combat situation (Geiss, 2015, p.13). The US, in its recent paper on the humanitarian benefits of LAWS technologies, described how AI could help to increase military awareness of the presence of civilians by automating the processing and analysis of data (Statement of the USA, 2018, p. 3). This would aid in planning more proportionate, discriminate attacks, thereby abiding by the principle of precaution. However, this does not address the issues associated with using AWS to execute those attacks, in that the current level of technology does not allow for robotic weapons to spontaneously adjust their attack plans based on changing circumstances in the battlefield. This returns to the issue of human supervision.

Finally, although the concept of military necessity is not codified in any single treaty, HRW argues that it exists as an ideal throughout IHL (HRW, 2012, p. 25). It requires that lethal force only be exercised against an adversary to the extent that is necessary for victory. As with the other principles, it depends on subjective and context-based considerations that might be beyond the abilities of LAWS due to technical limitations.

### 3.2. Ethical and Moral Debates

Although the main focus of diplomatic discussions has been on LAWS compliance with IHL, many strong ethical and moral concerns have also been articulated. These include such fundamental questions as whether the decision to take a human life should ever be delegated to a machine and what implications this might have for human dignity. It also includes the cross-cutting topic of responsibility for war crimes committed by LAWS, which is both a legal and a moral concern.

States, experts and civil society groups have expressed concern about the difficulty in attributing responsibility in the case of AWS committing war crimes. They fear that the complexity of the technology underpinning LAWS combined with their lack of moral agency (Heyns, 2013, p. 14) will lead to an “accountability gap” (Docherty, 2015) that would render LAWS illegal under IHL. International law mandates that individuals must be held responsible for their actions if they constitute a violation. The purpose of this personal accountability and its ensuing punishment is twofold; it serves to deter future violations and to give satisfaction and retribution to the victims (Amoroso, & Tamburrini, 2017, p. 17). IHL demands individual accountability for war crimes and IHRL further establishes the right to a remedy for victims of grave breaches (UN General Assembly, 2006). AWS as inanimate objects cannot be held legally responsible for any crimes they commit. Therefore, debate has focussed on who should be accountable and how this might be enforced. The main candidates that could be held to account are the system manufacturers, its programmers, the commander who deploys it or the state whose military it belongs to. The ICRC (2018) warns of the “risk of erosion – or diffusion – of responsibility and accountability” (p.11) for lethal decisions made by AWS. A prominent voice in this debate, ethicist Robert Sparrow (2007), has concluded that it would be impossible to satisfactorily hold anyone responsible for “robot war crimes”, meaning it would be unethical to use LAWS in warfare.

The legal situation is clear in the case of intentional unlawful acts. For example, the programmer would be held criminally responsible for deliberately writing algorithms that caused LAWS to attack civilians. Likewise, any commander who deployed LAWS in a civilian populated area whilst aware of problems with the system would be accountable. The main issue arises when all involved in the design and deployment of the weapon believe it is working correctly and employ it in a lawful manner. If the system still commits war crimes but these cannot be attributed to poor design or a procedural failure then none of the aforementioned candidates can easily be held accountable. Geiss (2015) contends that the complexity and

potential unpredictability of LAWS technology make these events likely. He concludes that it is essential to maintain meaningful human control over AWS as “the responsibility gap cannot be solved; the looming liability loop holes can be countered only by means of a total ban” (p. 23) of fully autonomous weapons. Former Special Rapporteur Heyns (2013) similarly warns of the danger of a “responsibility vacuum” emerging around LAWS that could grant impunity for their use, making them “unethical and unlawful”. He surveyed several ways in which accountability could be established, such as through the installation of recording equipment on LAWS with the requirement to review footage after a lethal mission, sharing responsibility among involved individuals or even assigning responsibility in advance of an attack (p. 15). However, any such measures would constitute only partial remedies and would require further debate and amendments to international law to make them binding.

At the heart of the ethical concerns is the question of whether lethal decision-making could be delegated to machines without violating human dignity. The inalienable right to dignity is a fundamental principle of IHRL, enshrined in the preamble of the Universal Declaration of Human Rights (UN General Assembly, 1948). Opponents of LAWS argue that removing human agency from the decision to kill erodes human dignity by reducing a person “to being an object – being merely a target” (Heyns, 2016b, p. 5). The Campaign to Stop Killer Robots (2018e) claims that “[a]llowing life or death decisions to be made by machines crosses a fundamental moral line.” Similarly, Heyns (2016b) links LAWS lack of moral agency and mortality with a threat to human dignity, describing it as “death by algorithm” (p. 5). Both Heyns (2013, p. 17) and the ICRC (2018, p. 11) have warned that, for some people, LAWS “conjure up visions of machines being used to kill humans like vermin”. Unease over LAWS lethal decision-making has also been noted in public opinion. The UNIDIR (2017b) described the public’s “instinctual revulsion” (p. 7) at the concept of inanimate machines making life or death decisions, seeing it as “a reaction to something repugnant” (p.8). This position was echoed in the responses of NGOs surveyed for this thesis, many of whom felt that this issue was the public’s primary concern regarding autonomous weapons. Of course, human dignity as an abstract concept is impossible to quantify, and for this reason proponents of LAWS argue this concern alone does not warrant a ban. Birnbacher (2016) posits that AWS are not intrinsically incompatible with human dignity but that care should be taken to “take precautions against potentially unethical uses of these weapons” (p. 121).

As previously discussed, advocates for LAWS claim they could make more ethical decisions on the battlefield due to their lack of emotions and prejudice. However, HRW (2012) argues that emotions are an essential restraint in armed conflicts (p. 39). Quoting various

military specialists and studies of soldiers' conduct in previous wars, they claim that humans possess empathy and compassion as well as a natural resistance to killing. LAWS on the other hand, while lacking negative emotions, are also devoid of empathy and mercy and will carry out any orders they are programmed to follow, regardless of how inhumane those may be. A human soldier might refuse to take part in an illegal attack. LAWS would have no such moral qualms and could be used to enforce the orders of tyrants or unethical non-state actors or groups.

It has been argued that even greater proliferation of unmanned systems will increase attacking forces physical and emotional distance from the battlefield, making it easier to kill (HRW, 2012, p. 40). This dehumanising effect has already been noted with drone warfare, and could lead to an increase in existing "video game mentality" for those who deploy autonomous systems (Geiss, 2015, p. 6). Conversely, some claim there is an ethical argument for replacing human soldiers with LAWS because states have a duty to protect their troops from physical and mental harm (Singer, 2009, p. 418). However, HRW (HRW & IHRC, 2014, p. 21) the ICRC (2018, p. 8) and Heyns (2013, p. 12) have disputed this claim. They reason that this function could be equally undertaken by the remotely-operated, semi-autonomous weapons already in use, such as armed drones, which retain a human-in-the-loop for firing decisions. Therefore, it is not a convincing argument for the development and use of AWS, except possibly in situations where a human operator could not respond rapidly enough to an incoming threat, such as in missile defence.

### **3.3. Technological Debates**

Other debates focus on the specific technological challenges of LAWS. Some question whether autonomous weapons could ever be trusted, citing potential issues related to their predictability and reliability. Meanwhile other concerns involve the difficulty of banning LAWS due to the dual-use nature of the technology as well as claims that a ban would be futile as their development is inevitable.

The military ethicist, George Lucas Jr., argues that, rather than concentrating on ethics, those who are developing LAWS should focus on ensuring their safety and reliability. This would entail addressing the potential risks of the technology, such as malfunctions or misuse (Lucas Jr., 2013, p. 219). However, as discussed in Chapter 2, the technology underpinning LAWS is complex and potentially unpredictable. Significant risks might be associated with systems that utilise AI and machine learning in their critical targeting functions. The ICRC (2018) argues that this leads to "fundamental questions of inherent unpredictability" (p. 2) in

LAWS, which could cause unacceptable risks for civilians in particular, linking this with issues of compliance under IHL. Furthermore, it cannot be assumed that machines will lack prejudice. LAWS may be influenced by algorithmic bias as a result of learning from prejudiced training data. The UNIDIR (2017a) highlighted the need for further research to understand “how biases influence outcomes in learning systems”. Naturally, the idea of prejudiced LAWS being deployed in armed conflicts makes many uncomfortable. The suggested remedy for this problem is to retain human supervision over the system. However, human – machine interaction has its own problems. Researchers have found that “humans are simply not good at understanding and managing dynamic systems, especially those that are more complex” (Krishnan, 2009, p. 42). This has led to accidents in the past (Krishnan, 2009, p. 42) and the conclusion that it could be safer to fully automate a system rather than allowing too much human intervention. Clearly, no easy answers exist to solving the predictability issue in LAWS.

Anderson and Waxman (2013, p. 14), Vilmer (2015) and others, have argued that a ban on LAWS would be counterproductive due to the dual-use nature of the technology. They fear a ban could limit the development of beneficial civilian applications of autonomous technology, such as self-driving cars. However, opponents of LAWS clarify that a ban would not mean the prohibition of specific technologies (Altmann, & Sauer, 2017). It would apply explicitly to research aimed at the development of AWS with full autonomy in their critical functions (HRW & IHRC, 2014, p. 26). In fact, many prominent private sector companies have welcomed the potential prohibition of AWS as they do not want their products to be associated with lethal machines (Altmann, & Sauer, 2017). Last year, 116 AI and robotics companies signed an open letter to the UN asking for greater efforts to control autonomous weapons (FLI, 2017). More recently, Google was forced to announce that it would not renew its contract with the US Defense Department due to the objections of its employees. Google’s work on Project Maven, which uses AI to interpret video images that could improve the targeting capabilities of drones, was seen by many as a precursor to increasingly autonomous lethal weapons (Shane, & Wakabayashi, 2018).

Finally, some critics of a ban on LAWS claim that their development is inevitable as “this genie has left the bottle” (Etzioni, & Etzioni, 2017, p. 79). Ackerman (2015) argues that no UN declaration or formal treaty would be able to prevent the development of LAWS as the barriers to creating the technology are too low. HRW (HRW & IHRC, 2014, p. 24), Sharkey (2012) and others (Russell, Tegmark, & Walsh, 2015) counter this, highlighting that the international community has previously succeeded in banning other weapons and even when



those bans have been breached or not universally ratified, the use of those weapons has been limited due to the stigma associated with them.

### **3.4. Peace and Security Issues**

In addition to the technical, legal and ethical implications of LAWS, their potential impact on global peace and security has been hotly discussed. Proponents of the technology cite its expected military advantages and financial benefits. On the other hand, critics have warned that LAWS could initiate a new international arms race, that proliferation could destabilise global security and lower the threshold for engaging in warfare.

Undoubtedly, there will be significant military advantages in using LAWS. It is expected that greater autonomy in weapons will increase the tempo of war, allowing for improved precision and faster response times beyond the capabilities of human operators (Krishnan, 2009, p. 41). The deployment of LAWS will also enable the reduction of manpower on the battlefield by acting as a force multiplier, meaning that fewer units are needed for a given mission (Etzioni, & Etzioni, 2017, p. 72). Unlike today's armed drones, AWS of the future will be able to fulfil their tasks even if communication links are severed (Etzioni, & Etzioni, 2017, p. 72; Krishnan, 2009, p. 41). Finally, using LAWS could reduce military casualties by removing human soldiers from the battlefield. In fact, the US DOD (2007) reasons that robotic fighters are better suited than humans to undertaking "dull, dirty, or dangerous" missions (p. 19). Additionally, many have highlighted the long-term financial benefits of using a smaller force of mainly robotic weapons (Francis, 2013).

Conversely, critics of LAWS warn that higher combat speeds could lead to uncontrollable escalations "from crisis to war" (Altmann, & Sauer, 2017) whilst fewer human casualties lowers the threshold for going to war. HRW (2012) warn that the ability to wage battles without military fatalities "would remove one of the greatest deterrents to combat" (p. 40) and lead to a more rapid escalation of political disputes into armed conflict. The ICRC (2018) cautions that further increasing human distancing from the battlefield enhances existing global asymmetries which could have a destabilising effect (p. 9). Asymmetric warfare involves technologically superior states acquiring virtual military invulnerability against less advanced adversaries. The unintended result of such superiority could be increased attacks against civilian populations as the only viable target left to a weaker opponent (UNIDIR, 2015, p. 10). Furthermore, one US military expert postulated that the use of robotic weapons "fuels the cycle of perpetual warfare" (as cited in Etzioni, & Etzioni, 2017, p. 74) because of the moral outrage they cause.

Other concerns include the danger of fuelling an international arms race. In their 2015 open letter, AI and robotics experts cautioned that if any major power pursued research into LAWS, an arms race would be inevitable, and cheap production costs could lead to them becoming “the Kalashnikovs of tomorrow” (FLI, 2015). Their fear that proliferation of the technology could lead to it falling into the hands of unethical oppressive militaries, terrorist groups and other non-state actors has been echoed by many others.<sup>9</sup> Furthermore, LAWS are vulnerable to interception and use by non-state actors, or even being hacked or spoofed (Heyns, 2013, p. 18). Such issues have already been seen in the way that terrorist groups have sought to repurpose commercially available drone technology. For example, during the 2017 Battle for Mosul, ISIS used multiple consumer drones armed with grenades to harass Iraqi forces attempting to retake the city (Watson, 2017; Solomon, n.d.).

### **3.5. Implications for Human Rights**

The development of AWS for use during armed conflict and in peacetime has wide-ranging implications for human rights. In their report ‘Shaking the Foundations’, HRW found that “fully autonomous weapons threaten to violate the foundational rights to life and a remedy and to undermine the underlying principle of human dignity” (Docherty, 2014, p. 1). Amnesty International (2016) raise further concerns that the unethical use of LAWS could undermine the right to freedom of peaceful assembly.

The potential use of LAWS against humans in armed conflict has obvious implications for the right to life. The right to life is inalienable and non-derogable under international treaty and customary law, even during war or national emergencies (UN General Assembly, 1948, Art. 2; UN General Assembly, 1966, Art. 4[2] & 6). According to the International Covenant on Civil and Political Rights (ICCPR), “No one shall be arbitrarily deprived of his life” (UN General Assembly, 1966). During armed conflict, the rules of IHL dominate. This means that LAWS would need to comply with the principles outlined earlier, namely those of precaution, distinction and proportionality. Inability to meet those requirements would likely render these weapons unlawful and any use of force would be classed as arbitrary, thereby violating the right to life.

Heyns (2016a) and HRW (Docherty, 2014, p. 1) highlight that most of the discussion about autonomous weapons has focussed on their use during armed conflict. However, AWS could be introduced into domestic law enforcement in the future, meaning that the much more stringent rules of IHRL would apply. During peacetime, killing is classed as arbitrary if it fails

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<sup>9</sup> see for example (HRW, 2012; ICRC, 2018; Altmann and Sauer, 2017)

to meet the following three requirements: the use of force must be only what is necessary to protect human life, must constitute the option of last resort and must be proportionate to the threat (United Nations, 1990). Furthermore, the right to security, enshrined in Article 9 of the ICCPR,<sup>10</sup> includes the right to bodily security and covers both lethal and non-lethal applications of force. Opponents of AWS fear the technology will never be equal to the challenge of meeting these criteria due to the complex and qualitative nature of the assessments required (HRW, 2014). Indeed, Heyns (2016a) contends that using AWS in law enforcement is of even greater concern than in armed conflict because the duty of police officers is to protect the public. He concludes that weapons which lack meaningful human control “should have no role to play in law enforcement” (p. 351).

In both armed conflict and law enforcement, the use of AWS could violate the right to a remedy. The right to a remedy is found in the UDHR (UN General Assembly, 1948, Art. 8), the ICCPR (UN General Assembly, 1966, Art. 2[3]), and several regional treaties. The ICCPR requires states to “ensure that any person whose rights or freedoms...are violated shall have an effective remedy” (UN General Assembly, 1966). As discussed, many fear that the use of LAWS could lead to an accountability gap, contravening this right.

Finally, as discussed earlier, there is the moral argument that LAWS could violate the principle of dignity that underlies IHRL by removing human agency from the decision to kill. Heyns (2017) argues that the right to life and the principle of dignity prohibit full autonomy in the delivery of force against humans, even if the technology eventually exceeds human targeting capabilities and reduces civilian casualties. This implies that meaningful human control must be maintained to uphold these fundamental human rights.

### **3.6. Conclusion: Should the development and use of LAWS be pre-emptively prohibited?**

The heated debates about LAWS reflect the complex challenges they present. While some predict that greater autonomy in weapons will improve compliance with IHL, others argue that technological constraints mean LAWS will never meet the legal requirements. Many experts question whether the current legal framework is even sufficient to adequately address the novel issues posed by autonomous weaponry. Some even contend that LAWS are not covered by international law and therefore cannot comply with it because it was written specifically for human participants of armed conflict (Geiss, 2015, p. 16; Asaro, 2012, p. 708). Meaningful human control has been touted as a solution to this problem. The ICRC (2018)

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<sup>10</sup> Article 9(1) of the ICCPR provides that: “Everyone has the right to liberty and security of person” (UN General Assembly, 1966).

advocates for a level of human control to be maintained that would preserve human agency and moral accountability in the decision to use force. They claim that while this would not necessarily require a complete prohibition of autonomy in weapons, it would mandate certain limits on autonomy (p. 22). Clearly, both ethical and legal concerns require that a human remains able to intervene or cancel an attack and technical considerations about predictability, reliability and safety need to be addressed before any autonomous weapon is deployed.

Nevertheless, even if fully autonomous weapons are able to comply with international law they might still fuel an arms race and create global instability. Moreover, legal compliance does not assuage deep concerns about the ethical and moral implications of a loss of human agency in lethal decision-making. Perhaps the most important issues are those that transcend law and politics and instead concern shared values. For many actors involved in the LAWS debate, the threat to human dignity and the erosion of accountability engendered by LAWS means that they should never be developed or used in armed conflict or peacetime. Therefore, in the opinion of this author and based on this review of the current debates, it seems that working towards a pre-emptive prohibition of fully autonomous weapons is the most prudent course of action to provide clarity and ensure that global security and human rights are protected.

#### **4. Achieving prohibition: The political situation and the role of civil society**

This chapter examines the different factors involved in achieving prohibition of fully autonomous weapons. The first part outlines the current international political situation and attempts to discover if a timely diplomatic solution to the LAWS debate is likely. The second section examines the role of civil society in international disarmament processes, focussing on the Campaign to Stop Killer Robots. The third part analyses previous successful weapons bans to identify areas that civil society can target to achieve prohibition of LAWS. Finally, previous public opinion polls are discussed as a starting point for the survey that constitutes the main research component of this thesis.

##### **4.1. The United Nations Convention on Certain Conventional Weapons (CCW)**

In order to clarify the current political situation regarding LAWS, a brief outline of the CCW and the expert meetings on LAWS within this framework will follow. This section also summarises the main approaches posited towards LAWS and considers whether a consensus solution can be reached before the technology has been developed.

The CCW is one of the principal instruments of IHL. It is formally known as the “Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects”. The agreement was adopted to prohibit or restrict weapons “considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately” (United Nations Office at Geneva [UNOG], n.d.). Although originally only applicable to international armed conflicts, since 2001 its scope has been broadened to include non-international armed conflicts too. The CCW was designed to ensure flexibility in the way that future weapons are regulated. It achieves this by including only general provisions in the Convention while all the restrictions on the use of specific weapons are contained in the Protocols annexed to it (ICRC, 2014). Currently, the CCW consists of five Protocols covering weapons with non-detectable fragments, landmines, booby traps, incendiary weapons, blinding lasers and the explosive remnants of war. Attempts to negotiate a sixth Protocol restricting the use of cluster munitions failed. This led to states frustrated with the CCW process launching negotiations outside the CCW which resulted in the 2008 Cluster Munitions Convention (Abramson, 2017). A decade before, the failure to agree on a total ban on the use of anti-personnel landmines led to the 1997 Ottawa Treaty, another convention agreed outside of the CCW process (Mathews, 2001). Currently, 125 states are parties to the CCW (United Nations Office for Disarmament Affairs[UNODA], n.d.). Less than half of those countries have adopted all five protocols, with

two being the minimum required to become a member of the CCW. There must be consensus of the states-parties for a new Protocol to be added to the Convention, though it is only binding on those states that ratify it. The main criticism levelled at the CCW is that it lacks verification and enforcement mechanisms and does not provide formal processes for resolving compliance concerns (Abramson, 2017).

In 2013, it was agreed that the CCW should begin considering LAWS, an action prompted by the annual report to the Human Rights Council of Christof Heyns, a former UN Special Rapporteur. Heyns (2013) highlighted the urgent need to establish an international body to monitor and discuss the evolving LAWS situation (p. 20). His recommendation for a moratorium on the development of LAWS, combined with increasing pressure from civil society, gave rise to a global call for a pre-emptive ban of the technology. Consequently, three annual, week-long “informal meetings of experts” on the topic were held at the CCW between 2014 and 2016. Over 80 states, many experts and NGOs participated in the multilateral forum, with many raising concerns about LAWS (Campaign to Stop Killer Robots, 2018d). However, little consensus was achieved, with much of the discussion stalled on defining LAWS. Nevertheless, at the close of 2016, states formalised these discussions by establishing a “Group of Governmental Experts” (GGE), which met for the first time in November 2017. The GGE met again in April 2018, with a second round of meetings planned for August.

#### **4.1.1. Meetings of the Group of Governmental Experts (GGE) on LAWS**

Many critics of LAWS hoped that the formalisation of the debate would ensure meaningful progress towards limiting or prohibiting development of the technology (Campaign to Stop Killer Robots, 2016a). However, the GGE meetings are not negotiations and the CCW discussions are not focused on achieving a tangible outcome to ban or regulate these weapons at present. The GGE’s mandate is to scrutinise emerging technologies that might underpin LAWS against the framework of the aims and purposes of the CCW.

In 2017, the GGE focused on four dimensions of the LAWS debate: technical, legal and ethical, military and cross-cutting issues. Some observers and states expressed frustration over the lack of progress in the discussions, with the Brazilian ambassador labelling them “unambitious” (Guilherme Patriota, as cited in Garcia, 2017). Despite broad participation, disagreements continued on definitions of LAWS and their appropriate legal framework. One point on which most states agreed was the importance of retaining meaningful human control over AWS, especially over targeting. This issue continued to dominate GGE discussions in April 2018, though divergent views on what level of control was truly meaningful persisted

(Pytlak, 2018, p. 1). The movement calling for a pre-emptive ban on LAWS gathered momentum. The Campaign (2018b) announced that the majority of participating states proposed that negotiations should begin on a legally-binding instrument to restrict LAWS at the next CCW meeting in November 2018. In fact, the list of states calling for a ban on LAWS grew to 26 at this meeting, with the significant additions of Austria and China (though notably, China only supports limiting the use of LAWS, not their development) (Campaign to Stop Killer Robots, 2018c). However, five states, France, Israel, Russia, the UK and the USA, rejected moving to negotiations of new law for fully autonomous weapons.

#### **4.1.2. Alternative approaches to LAWS**

Three main approaches to LAWS have emerged from the discussions. The first group of states, including Russia, the UK and the USA, claim that any move to prohibit LAWS is premature as their potential benefits and challenges remain unknown. They favour further discussion regarding the definition of LAWS and reject any binding codes of conduct or treaties. In their opinion, the Article 36 weapons review already suffices to determine the legality of new autonomous systems, rendering further regulation unnecessary. Critics counter that Article 36 is not sufficient though, as only a small number of states apply weapons reviews and they lack transparency (Group of Governmental Experts, 2017, p. 12). Furthermore, if each state adopts their own review mechanisms, the acceptable level of autonomy for weapons could vary hugely worldwide (HRW & IHRC, 2014, p. 3).

The second approach, led by France and Germany, promotes adopting a politically binding agreement, based on retaining an acceptable level of human control (Statement of France and Germany, 2017). This could be a code of conduct or a political declaration. However, this was rejected by the third group of states who see meaningful human control as incompatible with fully autonomous weapons and warn that such measures can only be an interim step. This last group includes the Non-Aligned Movement, composed of many developing nations, who have called for a new legal instrument prohibiting LAWS and support a moratorium on their development and use until new standards have been agreed (Statement of Venezuela on behalf of the Non-Aligned Movement, 2017).

#### **4.1.3. Conclusion: Is a timely diplomatic solution to the LAWS debate likely?**

Though the CCW and GGE debates have been useful for developing a deeper understanding of the issues, a lack of political will has hampered any tangible progress. In order to achieve new law at the CCW, a consensus must be reached, an unlikely outcome given the opposition of several powerful states. Many parties stress the importance of agreeing

limitations on full autonomy in weapons before the technology becomes available. They fear that once states possess such powerful weapons, they will be unwilling to accept restrictions on their use (HRW & IHRC, 2014, p. 23).

The Campaign to Stop Killer Robots has called on participating countries to commence negotiations for a legally-binding instrument on LAWS at the annual CCW meeting in November. Recent expressions of support for new law from Austria and China have raised hopes that progress can be made. However, many parties believe that the CCW may not be the best forum for negotiations due to its requirement for unanimity (Sauer, 2016; M. Wareham, personal communication, May 7, 2018). Brazil notably suggested moving the process outside of the CCW (Acheson, 2017, p. 6). Citing the landmine and cluster munitions treaties as precedents, some commentators have argued that, with the leadership of a high- or medium-power state, a group of like-minded nations and civil society groups could work together towards achieving a legally-binding instrument prohibiting fully autonomous weapons (Garcia, 2017; M. Wareham, personal communication, May 7, 2018). Critics counter that this is an ineffective solution as it would not include those countries most likely to develop and use LAWS. However, previous treaties negotiated outside of the CCW framework have shown that setting strong international norms can radically change attitudes towards producing and deploying certain weapons, stigmatising their use and enhancing arms control (Wareham, 2017).

## **4.2. Achieving prohibition: The Role of Civil Society**

This section briefly examines the evolving role of civil society in international disarmament processes, an area traditionally reserved for states. The relevant civil society actors in the LAWS debate are outlined, focussing particularly on the Campaign to Stop Killer Robots. Then, through discussion of previous successful weapons bans, the study aims to discover how civil society can best work towards achieving prohibition of LAWS.

### **4.2.1. Humanitarian Disarmament**

Regardless of whether the process to prohibit LAWS remains within the CCW or moves outside of it, both states and civil society have important roles to play. As discussed, several weapons have been internationally prohibited so far, the last three of which were banned within the preceding two decades. International legally-binding instruments restricting blinding lasers, antipersonnel landmines, and cluster munitions were all achieved since 1997 and in every case civil society played a pivotal role in bringing attention to the issue and convincing governments to agree to prohibition. All three bans were founded on the aspiration of improving the



protection of civilians, both during and after armed conflicts. This form of weapons control has been termed “humanitarian disarmament”. In this model, the issue is reframed as a humanitarian concern rather than a state-centric arms control situation, shifting the focus onto the human suffering caused by these weapons. Humanitarian disarmament prioritises civilian welfare and aims to realise it through the creation of strong international laws and standards. The model is also characterised by the key role played by civil society, often working in partnership with a variety of stakeholders (PAX, n.d.; Wareham, 2018).

The concept originated with the International Campaign to Ban Landmines (ICBL) which was awarded the 1997 Nobel Peace Prize for the unprecedented way in which it worked with like-minded states to establish the Mine Ban Treaty, described by the Nobel Committee as “a convincing example of an effective policy for peace” that it hoped would provide “a model for similar processes in the future” (Nobel Media AB, 2018). The 2008 Convention on Cluster Munitions was negotiated in a similar way, with a civil society-led campaign as the driving force that coordinated the effort to achieve new law. These two movements have been described as the “humanitarian disarmament standard bearers” (Wareham, 2017) and although neither treaty has succeeded in totally eradicating either weapon, the respective campaigns argue that they have established new international norms, stigmatising the weapons and drastically reducing their use (Wareham, 2017). Similarly, NGOs and the ICRC working with a small number of concerned states enabled an Additional Protocol IV limiting the use of blinding lasers to be added to the CCW before the weapons were introduced (States Parties to the CCW, 1995).

#### **4.2.2. Civil Society and the Campaign to Stop Killer Robots**

Several prominent humanitarian disarmament campaigns are currently in progress.<sup>11</sup> One of these is the movement to prohibit LAWS, spearheaded by the Campaign to Stop Killer Robots. The Campaign and civil society in general have played a prominent role in bringing attention to the LAWS debate and applying pressure to governments. Campaign representatives have participated in the CCW and the GGE discussions and HRW’s influential 2012 report, ‘Losing Humanity’ was a driving force that pushed LAWS onto the CCW agenda. The first people to seriously consider the risks of LAWS were a small group of scientists and technology experts who formed the International Committee for Robot Arms Control (ICRAC) in 2009. Initially, they struggled to get the issue taken seriously but by 2012 several other NGOs joined

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<sup>11</sup> See <http://www.4disarmament.org/portfolio/> for more information on ongoing humanitarian disarmament campaigns.

their cause. In April 2013, the Campaign to Stop Killer Robots was formally launched and within just six months, states agreed to begin discussions on LAWS at the CCW.

The Campaign (2018f) is a global coalition of 74 international, regional, and national NGOs from 31 countries, coordinated by HRW, working towards a pre-emptive ban on fully autonomous weapons. They advocate for meaningful human control over individual attacks that apply lethal force and call on governments to negotiate a new international treaty to govern the use of AWS. According to the Campaign, lethal use of force can never be delegated to machines since humans must always bear responsibility and retain control of any such attacks. The movement has strived to reframe the issue as a humanitarian concern in line with previous humanitarian disarmament campaigns and maintains a list of states which support their call for a pre-emptive ban.

Following the latest round of GGE meetings, the Campaign (2018d) announced several recommendations regarding LAWS and urged states to reach an agreement as “the window for credible preventative action in the CCW is fast closing.” Their most significant proposal was that states should commit to working with other stakeholders to conclude a legally-binding instrument prohibiting the development, production and use of LAWS by the end of 2019. States should also implement national legislation prohibiting LAWS to build support for the global ban. Moreover, other diplomatic options should be considered if the CCW process cannot achieve this outcome.

The Campaign has successfully motivated a broad range of groups to work towards their cause and has seen a steady growth in support for the ban among states, individuals and companies in the private sector. For example, in 2014 the Canadian defence manufacturer Clearpath, became the first robotics company to declare that it would not produce “killer robots” (Campaign to Stop Killer Robots, 2014). Further support came from UN agencies and representatives, notably in 2016 from two UN Special Rapporteurs who recommended that fully autonomous weapons should be prohibited (Campaign to Stop Killer Robots, 2018d). Most recently, the European Parliament (2018) adopted a resolution in support of beginning negotiations to ban fully autonomous weapons systems. Despite these positive developments, the civil society movement still faces obstacles to achieving a legally-binding instrument. In addition to the problematic CCW process and a lack of political will, other key challenges identified by Campaign NGOs in their responses to the questions posed for this thesis included general confusion over LAWS and a lack of funding for the issue, both at the international

level<sup>12</sup> and within the Campaign (M. Wareham, personal communication, May 7, 2018; R. Moyes, personal communication, May 4, 2018; E. Hunt, personal communication, May 3, 2018). Nevertheless, Mary Wareham, the Campaign's coordinator, said activists were "cautiously optimistic" about progress and felt that a timely ban was possible, though probably not within the framework of the CCW (personal communication, May 7, 2018).

#### **4.2.3. Lessons learnt: LAWS and previous successful weapons bans**

Previous successful weapons bans have frequently been cited as precedents for the current movement against LAWS. Naturally, comparisons have been made with the successful civil society-led campaigns to outlaw antipersonnel mines, cluster munitions and permanently blinding lasers. However, some have questioned just how useful these comparisons are given the revolutionary and complex nature of LAWS. Academics have identified a list of necessary criteria for a successful arms control treaty (Crootof, 2015b). Currently only one, active civil society support, is present in the case of LAWS, while other factors, such as strong state support and incompatibility with IHL, are yet to be fully realised and accepted. Moreover, LAWS are expected to be a unique weapon, capable of incredible speed and accuracy as well as reducing manpower needs, all of which bodes poorly for a ban according to the criteria. Nonetheless, many similarities exist between this campaign and previous successful bans.

Factors commonly associated with successful weapons bans include a favourable context and support from a sufficient number of states and key institutions, such as the UN and the ICRC. Both the landmine and blinding lasers bans occurred during the post-Cold War era of the 1990's, commonly seen as a time of political optimism and greater international cooperation. Conversely, the current political climate is more security obsessed, characterised by decreasing interstate cooperation. Resurfacing tensions between East and West, increasing right-wing rhetoric and multiple ongoing conflicts make it a difficult time to achieve a weapons ban, particularly within the CCW which requires consensus. Moreover, although the ban on LAWS has broad support, it lacks emphatic endorsement from the ICRC. The ICRC played a pivotal role in prohibiting blinding lasers and their support lent moral authority to the campaigns against landmines and cluster munitions. However, despite voicing concerns about LAWS, it has not proposed an outright ban. Instead, it calls on states to work towards retaining human control on the critical functions of weapons systems (Garcia, 2017). Furthermore, though most states support legislation on the use of fully autonomous weapons, they cannot agree what form that should take. In the case of both landmines and cluster munitions, the

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<sup>12</sup> The inaugural session of GGE meetings was cancelled due to several member states not paying their fees (Campaign to Stop Killer Robots, 2017).

process was moved outside of the CCW, led by a strong state champion. It is unclear if any states supportive of a ban on LAWS would be able to fulfil that role should an alternative diplomatic solution be necessary, though Wareham suggested that Austria might be suitable (personal communication, May 7, 2018).

Certain criteria for a successful ban relate to the weapon itself. Weapons of low military value that perform functions which can be easily replaced by another weapon are more likely to be prohibited. Blinding lasers are a good example of this because they “would not have been a groundbreaking addition to warfare” (HRW & IHRC, 2015, p. 17) whereas LAWS have the potential to revolutionise the way wars are fought. The lack of an agreed definition of LAWS is another significant barrier to prohibition. Most successful bans have required the weapon to be clearly defined to avoid restricting legitimate civilian research or impinging on other acceptable weapons. For example, the prohibition of blinding lasers dealt with a very specific category of weapons; only those causing permanent blindness.

Successful disarmament campaigns have utilised global broad-based coalitions with grassroots support and strong leadership, all of which apply to the Campaign to Stop Killer Robots. In fact, many who worked on the earlier successful campaigns are part of the current movement. Wareham cited this as a major advantage for the movement, explaining that civil society has retained its knowledge of disarmament processes “whereas governments often don’t, diplomats, politicians change” (personal communication, May 7, 2018). These successful campaigns garnered widespread media coverage, utilised a clear, consistent message, and benefitted from credible, compelling spokespersons in the form of victims of the weapon they sought to proscribe. Victims of landmines and cluster munitions were hard for decision makers to ignore and led to widespread public condemnation of those weapons. Since LAWS do not exist yet there are no victims or concrete evidence of the harm they cause. However, the Campaign claims this is a positive attribute since states have the opportunity to pre-emptively ban them before they create any casualties.

The Campaign has produced numerous reports and studies that have been widely circulated in the media and prompted support from influential leaders in the AI and robotics industries, such as Elon Musk and Stephen Hawking. The two open letters regarding the risks of LAWS signed by thousands of supporters in these industries in 2015 and 2017 increased public awareness of the Campaign and enhanced its credibility (FLI, 2015; FLI, 2017). However, public awareness and understanding of the main issues appears to remain low. Media coverage often portrays the debate as futuristic or far-fetched and runs stories alongside images

of the “Terminator” from the eponymous films. Wareham accepts that this has been detrimental to the Campaign but now that they have secured further funding, the movement will focus more on public engagement and creating a stock of more appropriate images to be used in the media (personal communication, May 7, 2018).

#### **4.2.4. Conclusions: How can civil society best work towards achieving a ban?**

It is beyond the scope of this thesis to determine if a pre-emptive ban on LAWS is feasible or how it might be implemented and verified. The aim is simply to discover where civil society can have the most influence. Based on previous successful weapons bans, the anti-LAWS movement possesses some favourable attributes whilst many aspects are still unknown due to the speculative nature of the technology. Several factors are stacked heavily against a ban, especially the high military value of LAWS and the opposition of powerful states. However, strong state opposition existed to banning cluster munitions and landmines, and cluster munitions are considered by some to have a high military value,<sup>13</sup> yet legally-binding bans were still achieved.

Some factors cannot be influenced by civil society, such as the novelty and utility of LAWS. Meanwhile, they have focussed their efforts on areas that have proved useful in banning other weapons, such as concerns about their ability to comply with IHL. However, these concerns are difficult to prove whilst LAWS remain speculative. Several NGOs surveyed for this thesis highlighted the lack of an agreed definition of LAWS as a barrier to prohibition and claimed that some states were using this issue to stall discussions. However, Wareham clarified that, despite what some critics have claimed, it was not the role of the Campaign to define LAWS or stipulate what should be included in a ban. Those decisions should be taken by governments once they start negotiating a treaty. She explained that “defining a weapon system is ultimately a political act...definitions are never agreed at the beginning, it’s always agreed at the end” (personal communication, May 7, 2018).

Currently, public awareness and opinions about LAWS is an area where civil society can have significant impact. Wareham declared that the movement is entering a new phase, launching a “much more public facing campaign” since they know from experience that public engagement is a strong motivator for diplomats and will help “to light a fire” (personal communication, May 7, 2018). Certainly, public concern was a powerful factor in achieving previous weapons bans as it pressured national governments to take decisive action.

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<sup>13</sup> The US is not a party to the Convention on Cluster Munitions but had pledged to end most of its use of the weapons by 2018. However, in a policy shift, the US decided to retain its use of cluster munitions, citing the need to “deter North Korean aggression” (Abramson, 2018).

### 4.3. LAWS and Public Opinion

Public engagement with the LAWS debate is essential, both for democratic reasons and to satisfy the requirements of the Martens Clause. Several public opinion polls have been undertaken to explore prevailing attitudes towards these weapons. Of course, public opinion is not equivalent to the public conscience. Moreover, given the complex nature of the subject, it is unwise to rely only on opinion polls as they cannot suffice for deeper ethical discussions. However, according to the ICRC (2018), opinion polls are useful for igniting wider debate, demonstrating significant public interest and engagement and revealing trends related to public conscience concerns about LAWS (p. 20).

The main research component of this thesis is a survey to test current public awareness and attitudes towards LAWS. Utilising the results of this survey and of preceding polls, the aim is to identify the most resonant aspects of the debate so that they can be targeted by the civil society campaign, increasing public engagement and building support for a ban. The following section briefly outlines the most prominent public opinion polls related to LAWS.

#### 4.3.1. Previous public opinion surveys on LAWS

Thus far, few public opinion polls have been carried out to discover levels of support for AWS and none have sought to gauge existing levels of awareness about the issue. Several earlier polls of public opinion were carried out in the US regarding the use of remotely-operated drones<sup>14</sup> but for the purpose of this study only the major surveys related to AWS will be discussed.

Several surveys tried to exclude bias against robotic weapons in general by contrasting the use of remote-controlled drones with AWS. Moon, Danielson, and Van der Loos (2012) surveyed over 250 experts and laypersons in the USA about morally contentious applications of robotics. Their results suggested that the public's perception of a robot's level of autonomy and the field it was applied to played a key role in their acceptance of the technology. Overall, there was evidence of greater rejection of AWS compared to remote-controlled drones.

Carpenter (2013) surveyed the US public, posing two questions to gauge differences in opinion between the use of remotely-operated drones and AWS. She aimed to discover if public opposition to AWS was strong enough to satisfy the Martens Clause and used a mixed methods approach. The first question asked respondents how they felt about the trend towards using completely autonomous weapons in war. The second tested respondents support for the

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<sup>14</sup> See, for example: (Arkin, & Moshkina, 2007; Danielson, Moon, & Van der Loos, 2012; Jenkins, & Woolley, 2013)

civil society movement working towards a ban. Carpenter varied the wording on both questions between “killer robot” (the term used by the Campaign) and “fully autonomous weapons” to test whether this language affected public attitudes. 1000 Americans responded and were matched on various demographic data. Carpenter found 55% of Americans opposed autonomous weapons and 53% expressed support for the Campaign. The variation in wording of the questions appeared not to affect responses. This study was widely praised for its good design and neutral phrasing that helped to avoid moral bias (Millar, & Moon, 2015, p. 13; M. Wareham, personal communication, May 7, 2018).

However, Horowitz (2016) claimed that Carpenter’s study was conducted “in a vacuum” as it did not provide contexts for the use of AWS. Therefore, in 2016 he conducted two quantitative studies about AWS and US public opinion. He aimed to test whether different contexts influenced public support for the development of AWS with reference to the Martens Clause. The results suggested that contexts did influence public support for AWS. Unsurprisingly, opposition to the technology decreased when AWS were described as protecting US troops, being more effective than alternatives or when foreign forces were developing them. Criticisms of this study were widespread. Carpenter argued that a qualitative approach would have allowed respondents themselves to define the relevant contexts for the use of AWS which would have been more appropriate for discerning the public conscience. Both Carpenter and Wareham criticised Horowitz’s study for being biased and only including positive contexts for the use of AWS (Carpenter, 2016; M. Wareham, personal communication, May 7, 2018). Millar and Moon (2015) criticised this research for its “anthropomorphic framing effects” (p. 14) in the language of some conditions as well as other “moral psychological biasing effects” (p. 15).

The Open Roboethics Initiative (ORi, 2015) surveyed 1000 people from 49 different countries in 2015 using an online poll that was translated into 14 languages. They asked six questions about ROWS (Remotely Operated Weapon Systems) and LAWS. Results showed that most respondents felt all types of LAWS should be banned and 56% said LAWS should not be developed or used. An overwhelming majority (85%) of people said LAWS should not be used offensively. Overall, the results demonstrated stronger opposition towards LAWS compared to ROWS, implying most respondents valued retaining human control over weapons. Criticisms of this study included that its quantitative style closed questions could result in bias. Carpenter argued that a qualitative approach was preferable. However, ORi explained that translation limitations made the use of open-ended questions impractical (Millar, & Moon, 2015, p. 18).

More recently, an Ipsos poll (2017) surveyed 11,500 adults in 25 different countries on their support for using AWS in war. Like Carpenter and Horowitz, this poll described AWS in relation to drones, explaining that AWS will be able to select and attack targets independently. It found that worldwide, the majority of respondents opposed AWS (56%) though opposition varied by country, as well as by age and gender. Russia (69%) and Peru (67%) showed the greatest opposition to AWS, while India (31%), China (36%) and the US (45%) were the least opposed. This study only asked one question so lacked depth. However, it is the most recent major poll and provides the most global representation of public opinions about AWS gathered so far.

Each of these surveys was subject to some form of bias and none gathered enough responses to be considered representative. Nonetheless, they reveal trends about the public's attitudes towards AWS that warrant further exploration. Additional surveys are needed to test public opinion about LAWS, discover which concerns are seen as most relevant and evaluate potential levels of support for a ban. The survey produced for this thesis took these earlier polls as a starting point, particularly those of Carpenter and ORi since their questions were arguably the least biased and produced the most illuminating results.



## **5. Research Methodology**

The aim of this chapter is to present the research methodology and techniques used in this study. It begins with a brief discussion of the central research question and hypotheses, outlines the research design and defines its scope and limitations.

### **5.1. Research Question and Hypotheses**

The overall research question for this study was: “How can civil society engage the public on LAWS and gain support for an international ban on their development and use?” Several hypotheses were made in order to analyse this research question: Hypothesis 1: Levels of public awareness of LAWS will be low. Hypothesis 2: Once informed about LAWS, the majority of the public will not support their development or use and most will support a ban on development and use. Hypothesis 3: Support for some use of LAWS will increase when given varied contexts. Hypothesis 4: Overseas use of LAWS will be more popular than domestic use.

These hypotheses were based on previous surveys of public opinion conducted in other countries, on the insights and experiences gained from individuals working with the Campaign and on the author’s own suppositions gained from reviewing the literature and from informal discussions on the subject with lay members of the public.

### **5.2. Public opinion survey about LAWS**

The main component of this research was a survey of students. It was translated into Greek and specifically targeted Greek speaking students at Aristotle University where the author was based during the research period. The survey was comprised of seven sections, and sought to discover students’ level of awareness and feelings about the development and use of LAWS. Mostly closed questions were used, though three questions included the option “Other” which offered the chance to write answers freely. Respondents were asked whether they would support the development and use of LAWS, whether they would support a ban, if there were any situations when the use of LAWS might be permissible and which issues they prioritised when considering rejecting or supporting the development and use of LAWS. It also gathered information on five demographic variables: age, gender, education level, subject being studied and nationality. Respondents were asked about their military background too. They were asked if they were currently or had ever served in the military, if any member of their immediate family had done so or if they had no military connection. This information was gathered in order to discover if there was a correlation between these variables and the students’ chosen

answers. Similar data was collected in previous opinion polls conducted about LAWS.<sup>15</sup> However, the information on military background may be of limited value in this survey as Greece has mandatory military service meaning that almost everybody has some form of connection to the military (Central Intelligence Agency [CIA], n.d.). The survey was administered online and in an identical paper format.<sup>16</sup>

The purpose of this survey was to test the levels of awareness about LAWS and to discover people's reactions to the development and use of this technology in the near future. Previous opinion polls about LAWS have generally been limited to the Anglophone world, although the ORi study (2015) and the Ipsos poll (2017) were more global in scope and were translated into many of the major world languages, but not Greek. However, it appears that little research has been conducted on Greek attitudes to the development and use of LAWS technology. Therefore, the author of this study believed it would be useful and would add value to the existing body of knowledge if this survey specifically targeted Greek attitudes towards LAWS. Moreover, as the debate around LAWS evolves rapidly, it should be expected that public opinion will likewise change, so polls conducted a year or more in the past may no longer be reliable as a test of contemporary feeling on the issue, hence the value in conducting this research now. Additionally, previous surveys did not test levels of awareness of LAWS, focussing instead on attitudes towards these weapons. This aspect of the survey was therefore a novel addition, introduced to test the first hypothesis.

Other parts of the survey took inspiration from previously conducted polls, using some of their questions as a starting point. For example, when informing respondents of the nature of LAWS technology in question 2, the definition compared AWS to the currently existing technology of remotely-operated drones as a reference. This aspect of the definition was based on that used in two other surveys, Carpenter's (2013) poll and ORi's (2015) global survey. Likewise, the phrasing of question 3, which explained that several NGO's were attempting to achieve new international law to create a treaty banning the development and use of fully AWS in the future was also based on a question posed in Carpenter's study. These models were chosen for their clarity, ease of understanding and neutral tone since communicating the nature of LAWS technology and the ban without unduly biasing responses was of paramount concern.<sup>17</sup> This also provided the opportunity to compare and contrast the results and conclusions drawn from this survey with the polls of the general public in other countries,

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<sup>15</sup> For example: Carpenter's (2013) US opinion poll or the global Ipsos (2017) survey.

<sup>16</sup> See Appendix A and Appendix B for copies of the original survey in English and Greek.

<sup>17</sup> For a full discussion of each question posed in this survey, including its relation to previous surveys, refer to Chapter 6: Results Analysis.

though any comparisons could only be speculative, given that none of these studies were representative.

The fifth part of the survey contained two questions. The first asked respondents to choose one reason from six different options as the main reason to support the development and use of LAWS or to write their own answer under “Other” if they preferred. The second question repeated the same format but asked why one should reject the development and use of LAWS and gave different, corresponding options to choose from. To avoid question order bias, the questions in this section and in the demographics section were randomised. This was also the case with the paper version. Two different sets were printed, one with the “support” question first, the other with the “reject” question first.

### **5.3. Methodological issues: Limitations and Delimitations of the study**

In this section, several issues regarding the methodology will be discussed as well as the limitations and delimitations of the study. These concerns could have implications for the validity of the study and where possible, some countermeasures have been described which could address the issues.

#### **5.3.1. Translation and pre-testing**

In order to engage Greek people, it was necessary to first translate the survey from English into Greek. As the author possesses only basic Greek language skills, a professional translator was engaged to perform this task. Pre-tests were then undertaken with three native Greek speakers who also have professional competency in English. They took the Greek version of the test (though without submitting their responses so as not to bias the final results) and discussed any issues or inconsistencies with the author in English. This was done so that the author could verify that the translation was correct and intelligible and to ensure that the original meaning had not been lost. However, it is necessary to acknowledge that despite pre-testing, some minor discrepancies may still have occurred due to the translation process.

#### **5.3.2. Sampling and target population**

The target population for this study was students at the Aristotle University who could read and understand Greek. While the author acknowledges that it would have been more desirable to survey a representative sample of the population of Greece in order to generalise the results to the whole country, such a process is well beyond the scope of this study. Therefore, the decision was made to limit the study to Greek speaking students. Traditionally, university students have often been expected to be more politically aware and active than other

groups due to their environment. Therefore, it could be expected that students might have higher levels of awareness and engagement than their non-student counterparts. Nonetheless, the aim of this survey was to provide a “snapshot” of current attitudes and awareness levels regarding LAWS among a target population that had not previously been surveyed about this subject. Also, the results may still be compared to those of the general public in previous surveys conducted in other countries as long as the difference in sampling was acknowledged and taken into account. From this information, the author hoped to draw conclusions and potentially make recommendations on how best to target future campaigns regarding LAWS.

The choice to limit the study to one section of society limits the external validity and reproducibility of the results as they cannot be generalised to the Greek population as a whole. In fact, the sample size for this survey was relatively small compared to the total number of students enrolled at Aristotle University. Approximately 73,930 students were enrolled at the Aristotle University at the time of this study, including foreign and domestic students (Aristotle University, n.d.). It was not possible to obtain a list of all the Greek speaking students enrolled at the university which meant that, although a probability sampling technique would have been ideal, it could not be used in this case. Therefore the study was based on volunteer sampling, leading to a high probability that the results were subject to sample bias. Sampling bias refers to situations in which the sample is not reflective of the characteristics of the target population (Singh, 2007, p. 408). This means that the results of this study need to be considered carefully, documenting the potential bias (Bernard, 2006, p.187).

### **5.3.3. Data Collection Methods**

The survey was administered in both a paper form and online, using Google Forms.<sup>18</sup> The results were then combined in an Excel spreadsheet. An extra column was added to include the variable “input method” and different values were assigned to results collected online and offline. The reason for administering the survey in two forms was to increase the response rate since it is notoriously difficult to secure large numbers of participants for online surveys (Basnov, Hjollund, Holm-Christensen, & Kongsved, 2007; Capaccioli, & Yetter, 2010). Therefore, paper copies were distributed in person by the author during some classes at the university. To ensure the internal validity of the study, the survey was reproduced on paper exactly as it appeared online. Each section was given a separate page just as it had online and

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<sup>18</sup> The survey can be accessed here (although responses will no longer be evaluated since the study has closed): [https://docs.google.com/forms/d/e/1FAIpQLScOQkzGtSIG-uQ3ORowCrv-csLZ0HhvTeYp0htKvwQgYwVzZw/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLScOQkzGtSIG-uQ3ORowCrv-csLZ0HhvTeYp0htKvwQgYwVzZw/viewform?usp=sf_link).

care was taken to avoid unnecessary interaction with respondents as there would have been no contact with them had they completed the survey online.

Other discrepancies could potentially have affected the validity between the paper and online surveys; for example, the online survey forced respondents to complete every question before moving onto to the next section whilst the paper version could not control respondents' actions in this way. Therefore, it was important to check for any discrepancies between the two versions of the survey before combining the results for further analysis. In fact, as expected, several respondents failed to complete every question so their responses were removed from the final tally to ensure homogeneity during the analysis stage.

#### **5.3.4. Distribution methods**

The online survey was distributed via the snowball method by email with an anonymous link to ten Aristotle University professors (known to the author through the E.MA programme) who further distributed it to their students. The benefits of this method are that it is convenient and students might have been more willing to respond when invited by a professor known to them. However this approach offered no guarantee of the final number of responses, hence the administration of the paper version as well. Moreover, it added to the potential for selection bias as it only targeted students taught by professors known to the author, so the sample was not representative of the university population as a whole and only received responses from students enrolled on particular courses. This increased the risk that the results would reflect the views of a particular group of like-minded people who hold similar ideas and values. For example, psychology students might have quite different knowledge and views on LAWS when compared to engineering students. However, the fact that the ten professors involved taught across a variety of disciplines should have helped to minimise this problem. Another drawback of the snowball method is the risk that students on the same course might take the survey and tell other participants about the questions before they completed it which could influence their answers. Lastly, there was a small risk that the survey might be sent outside of the university, contaminating the sample. However, without storing personally identifiable information it was quite difficult to counter this issue.

#### **5.3.5. Other Issues**

There are several other issues which can be identified as limitations and delimitations of this study. First, the selection of options given to respondents to choose from for questions 4 and 5 were derived from the main issues found in the literature and from insights gained from the questionnaires and interview completed by members of the Campaign. However, the

selection was based on heuristics rather than objective method and several alternative options were left out as the author did not want to overload respondents with too many options. For example, question 4 asks respondents to select one out of six options as the main reason to reject the development and use of LAWS, which risks the possibility that the reason they believe is most important was omitted. To counter this issue, an extra option, "Other", was added that allowed for a written response. However, most respondents are likely to choose one of the offered options rather than writing their own response, meaning that their options are limited to the reasons selected by the author (Krosnick, 1999, p. 544 as cited in Bernard, 2006). As a consequence, it is likely that the choices suffer from researcher bias. Other researchers may have selected different reasons. Therefore, this method of selecting options might be difficult to replicate and affects the reproducibility and internal validity of the study. A more reliable approach would have entailed holding focus groups with students from the target population (those that can understand Greek) using open-ended questions to discover the most common issues in a natural manner, rather than forcing the researcher's choices on them. However, due to constraints of time and resources, especially difficulties arising from the language barrier, this was not possible.

## 6. Results and Analysis

### 6.1. Introduction

The overall research question for this study is “How can civil society engage the public on LAWS and gain support for an international ban on their development and use?” This question was arrived at after reviewing the current debates about LAWS, examining the political situation and highlighting civil society’s key role in working towards a ban. One of the areas where civil society can have the most influence is public engagement with the LAWS debate. This is a particularly important subject since the dictates of the public conscience have been invoked under the Martens Clause as a major concern and a potential legal reason to prohibit LAWS (ICRC, 2018, p. 22; HRW, 2012, p. 24; HRW & IHRC, 2014, pp. 16-17). In order to further explore the research question, the author decided to undertake a public opinion survey about attitudes towards LAWS, the results of which are presented and discussed in this chapter. Furthermore, four hypotheses were made in order to analyse the research question and are also incorporated in the discussion below.

Previous public opinion polls about LAWS have generally found that the public is uneasy about the use of fully autonomous weapons and opposes surrendering human control over lethal decision-making. For example, Carpenter’s 2013 survey found that 55% of Americans opposed developing AWS and 53% supported banning killer robots. Similar conclusions were reached by ORi (2015) through a more global poll. The 2017 Ipsos poll also used an international sample but found much more variation in levels of support for AWS, with significant disparity across different age groups and nationalities. Horowitz’s (2016) surveys sought to discover if providing different contexts for the use of LAWS would affect levels of support for them, though his studies were heavily criticised for only providing positive contexts that primed his respondents (Millar, & Moon, 2015, pp. 14-15, Carpenter, 2016; M. Wareham, personal communication, May 7, 2018). Some of these studies served as starting points for questions in this survey and the relationship between them is discussed further in the main analysis.

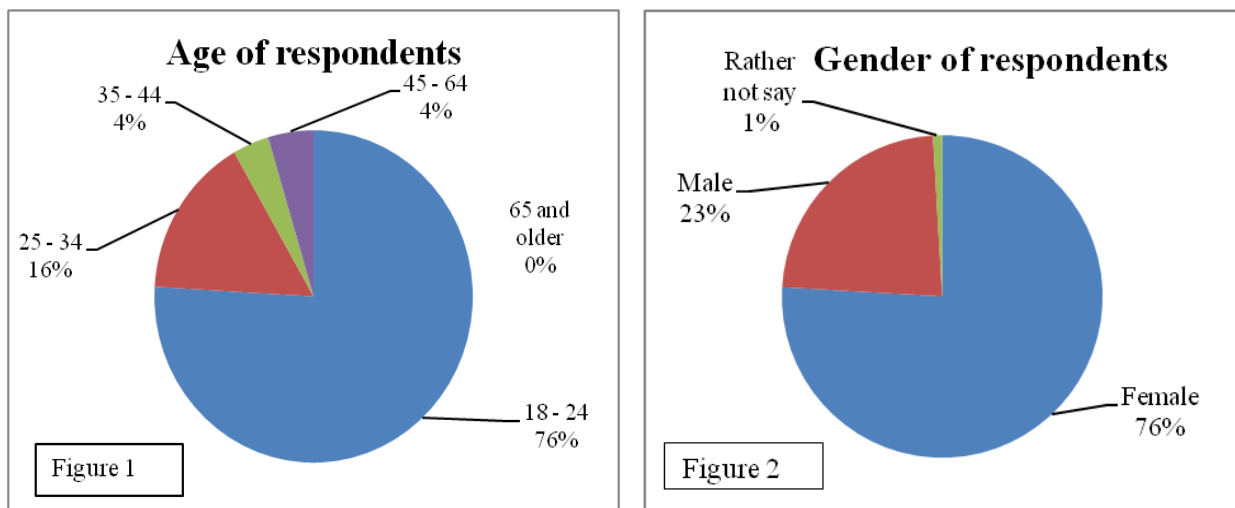
Given the low levels of public knowledge on the LAWS issue, the variation in findings of these earlier polls and the fact that little work has been carried out in Greece on this topic to date, it seemed timely to carry out a public opinion survey for this thesis. The aim was to discover first what the current levels of awareness of the LAWS issue was, if there was strong public opposition to LAWS and whether significant support for a ban existed. Secondly, the study sought to discover what reasons people considered most important for supporting and

rejecting the development and use of LAWS in order to identify areas to be targeted in public engagement campaigns. Finally, the survey tested whether there were some applications of the use of LAWS that could be considered acceptable or if levels of opposition remained stable.

## 6.2. Participation and Sample Analysis

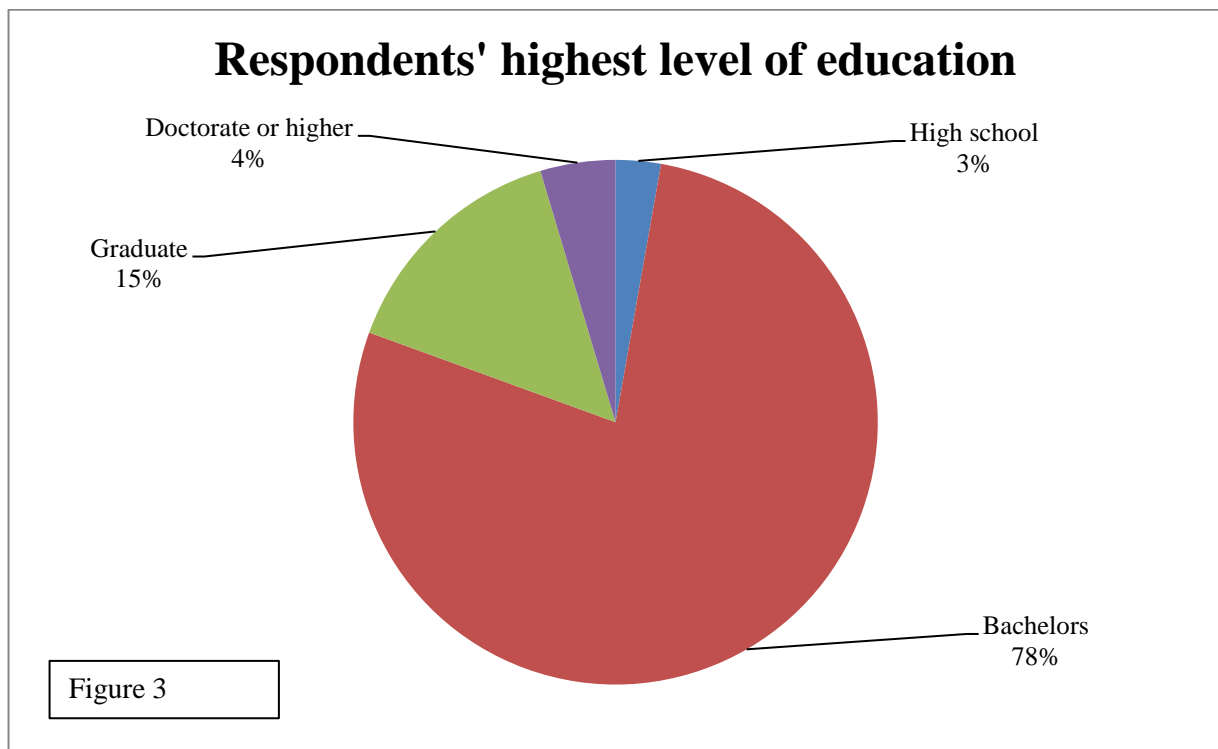
120 people responded to this survey, though some questions received more responses than others. In the end, 110 people completed all of the questions correctly. The ten responses that were incomplete were excluded from the final analysis to retain homogeneity. All but two of the respondents identified as Greek nationals. The two surveys completed by participants with other nationalities were also excluded from the final analysis for reasons of homogeneity. Therefore, the final tally of responses used for this analysis was 108.

All of the respondents to this survey were students enrolled at the Aristotle University in Thessaloniki, Greece. In the final data set used for this analysis, the vast majority of participants (76%) were aged between 18 and 24 years and had completed some or all of a Bachelors degree (78%) as their highest level of education (see Figures 1 and 3). This distribution was expected given the target population. Most respondents were female (76%), with less than a third identifying as male (23%) (see Figure 2). Previous public opinion surveys about LAWS have tended to have more female respondents than male but the disparity was not as large as is the case in this study.<sup>19</sup>

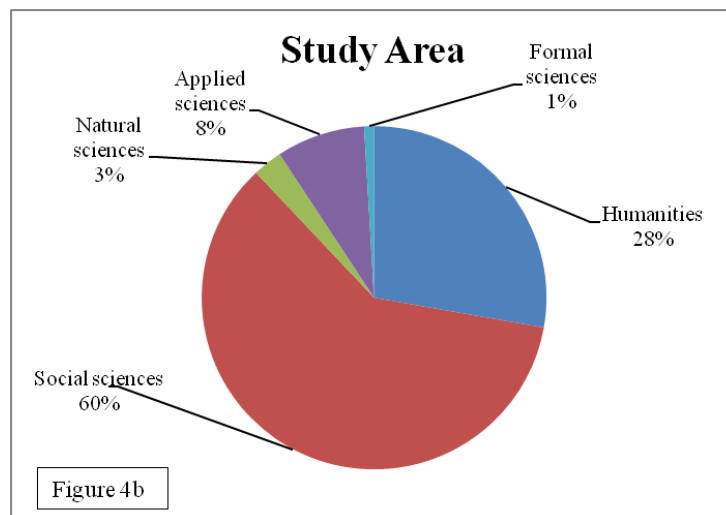
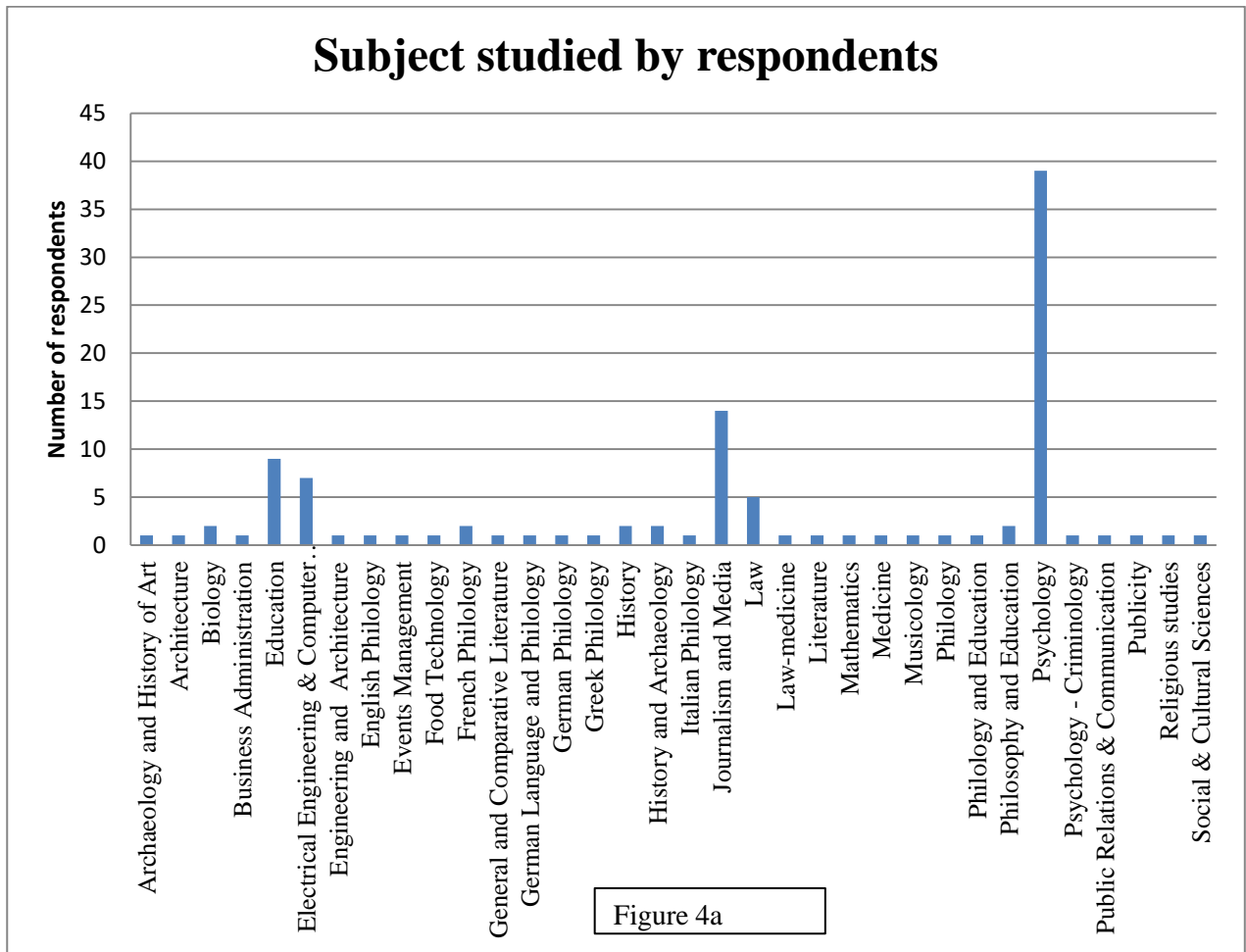


<sup>19</sup> For example, 475 men and 525 women responded to Carpenter's survey (2013).



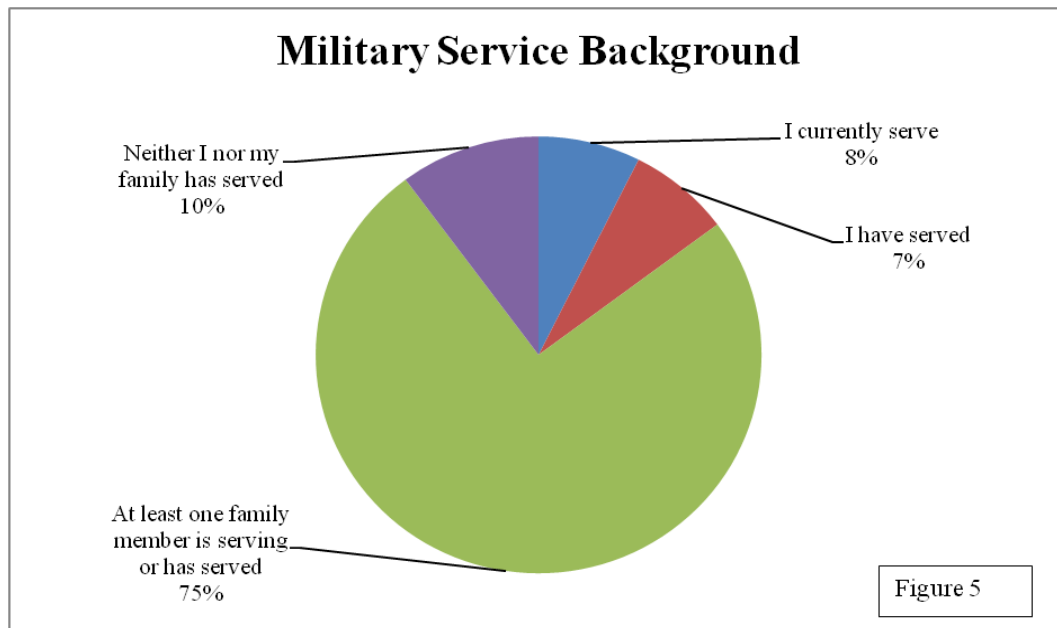


Respondents reported studying a diverse range of subjects, including electrical engineering and computer engineering, law, history and education, meaning that the knowledge base was broad. However, the most common subject being studied was psychology (36%) followed by journalism and media (13%) (see Figure 4a). The most common subject area was social sciences (60%) followed by humanities (28%) (see Figure 4b). As discussed in the methodology chapter, it can be expected that students studying different subjects will have varying levels of awareness and opinions about LAWS.



Altogether, 15% of people who completed the survey reported that they currently served in the military or had served in the past and 75% had at least one family member who is or has served in the military. This left only 10% of respondents without any connection to the military, a much lower figure than that found in previous surveys (see Figure 5). 61% of Carpenter’s (2013) respondents had some form of relationship to the military while the same was true for just 55% of the respondents to the ORi survey (2015). This was expected since

Greece still has mandatory military service for all men between the ages of 19 and 45 (CIA, n.d.).



### 6.3. Levels of Awareness of LAWS

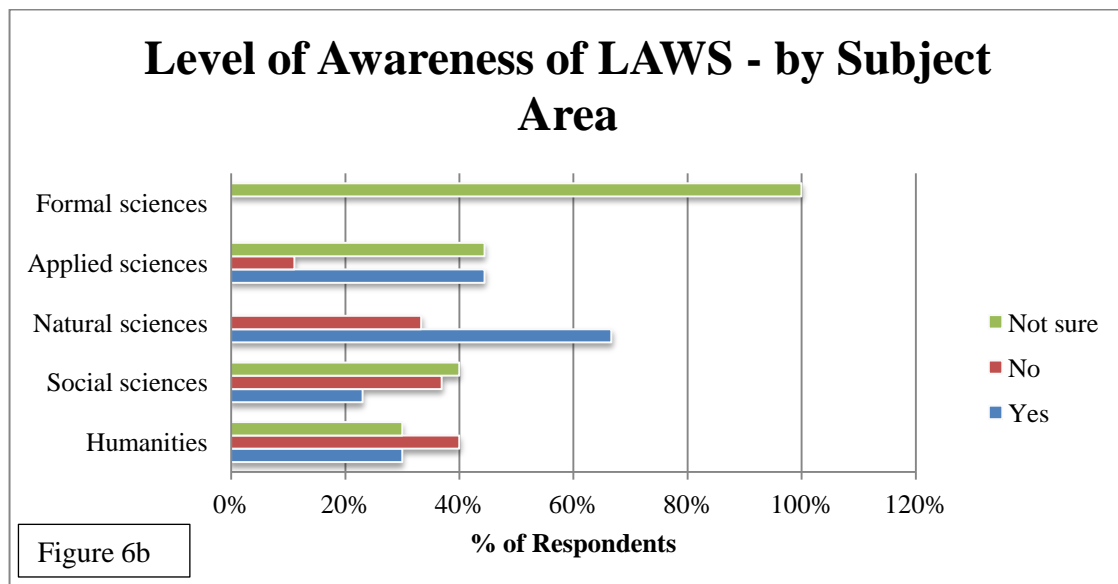
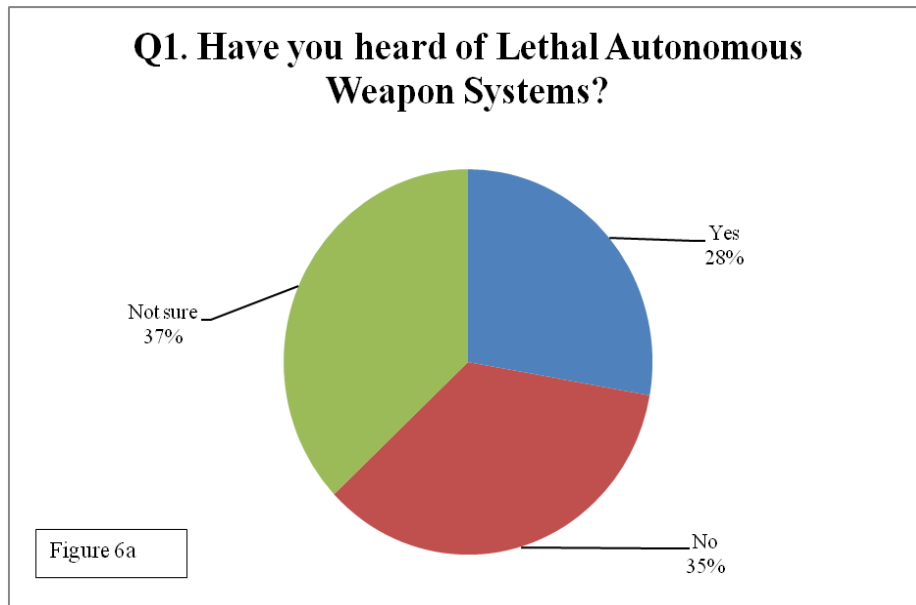
A defining feature of this survey when compared to those that were undertaken previously is that it tested for levels of awareness among respondents. The purpose of this was to assess the first hypothesis of this study, which was that levels of awareness about LAWS would be low among the public. This assumption was arrived at for a variety of reasons including the “futuristic”, overly technical nature of LAWS, the paucity of in-depth, mainstream media reporting on the issue and the difficulty of attracting and retaining public focus for a threat that does not exist yet. The hypothesis was based on the author’s review of the relevant literature, contact with the Campaign NGOs and her own personal experience of discussing the issue with people who had no direct involvement with it. Overall, the author hypothesised that few people outside of the technology sector or Campaign groups would be aware of LAWS.

Individuals from the Campaign NGOs who responded to the questions posed for this thesis generally believed that awareness of LAWS was low or very low in their countries (Italy, Japan, Canada, the Netherlands, the UK and the USA) and globally, though one declared that awareness was “rapidly growing” (E. Hunt, personal communication, May 3, 2018). Erin Hunt, of Mine Action Canada, explained that “we see more awareness in countries with a strong robotics, AI or tech sector and lower awareness in states that do not have those industries” though it was increasing in both types of states (personal communication, May 3, 2018).

Allison Pytlak of Reaching Critical Will, echoed those sentiments, saying that, “My sense from engaging with Campaign members from other parts of the world, such as Africa, is that there is little to no awareness of this issue yet” though her organisation is working to address this with awareness raising and information sharing initiatives through their networks and national offices in Africa (personal communication, June 3, 2018).

The NGO respondents gave several reasons for low levels of public awareness of LAWS. Francesco Vignarca of Rete Disarmo (Italian Network on Disarmament) blamed a lack of serious, in-depth media coverage that tended to frame the issue in a superficial manner “based on recalling fictional movies and situations (Terminator, Robocop, etc)” (personal communication, May 24, 2018), a position echoed by Daan Kayser, of PAX (personal communication, July 9, 2018). Yuki Sakurai of AAR Japan, felt that the media coverage of AI and robotic issues in Japan tended to focus only on positive, non-military aspects and avoided discussion of negative subjects such as LAWS (personal communication, June 29, 2018). Others felt that media coverage was good in their country but were unsure whether it reached mainstream audiences and wondered if LAWS were becoming confused with other AI stories or with combat drones (A. Pytlak, personal communication, June 3, 2018; D. Kayser, personal communication, July 9, 2018). Several respondents felt that it was difficult to gain the attention of either the public or the politicians on the issue due to its remaining rather a “niche subject” (A. Pytlak, personal communication, June 3, 2018). They explained that it was challenging to get people’s attention about LAWS with so many other pressing issues on the international agenda, describing it as a matter of limited “bandwidth” (E. Hunt, personal communication, May 3, 2018; D. Kayser, personal communication, July 9, 2018).

The results of this survey appear to confirm the first hypothesis (see Figure 6a). Less than a third (28%) of respondents reported that they had heard of LAWS. 37% were unsure while 35% confirmed that they were not aware of the issue. The author surmised that subject area might influence respondents’ levels of awareness. This seemed to be true as awareness of LAWS was significantly higher among those who studied subjects in the natural sciences (67%) and applied sciences (44%), which is unsurprising given that those areas included subjects such as electrical engineering and computer engineering (see Figure 6b). However, this trend should be considered in light of the fact that these subjects generated fewer responses overall when compared to other areas like social sciences.

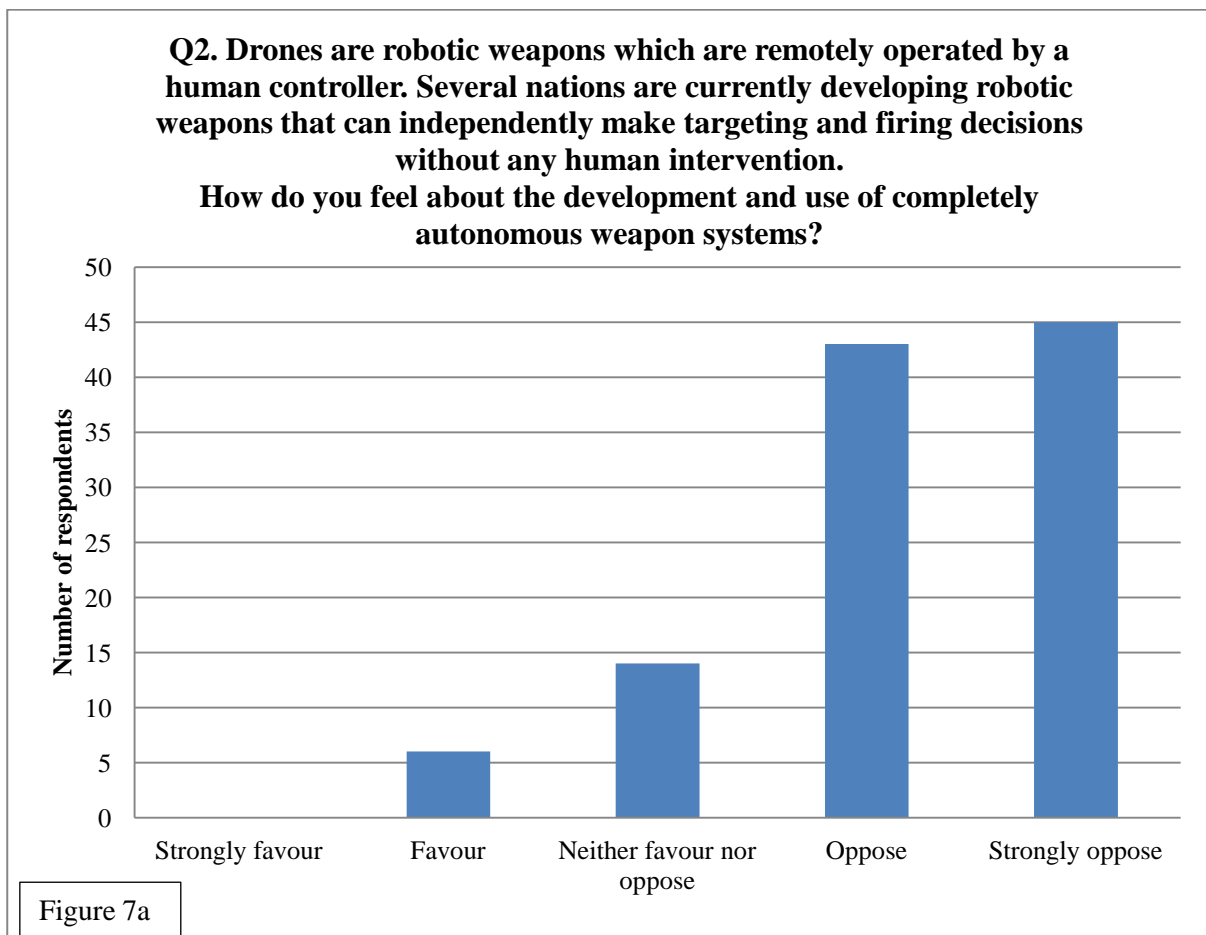


#### 6.4. Support for development and use of LAWS

The second hypothesis predicted that once informed about LAWS, the majority of the public would not support their development or use and most would support a ban on them. Question 2 of the survey sought to test the first part of this hypothesis. Based on a question first posed by Carpenter in her 2013 poll, it compared the current use of remote-controlled drones to the anticipated move to using LAWS technology. This comparison was used to explain the nature of the technology and to try to exclude answers based solely on antipathy towards robotic weapons. Respondents were asked about their feelings on the use of completely autonomous weapons and had to choose an option from a 5-point scale.

As predicted in the hypothesis, the vast majority of respondents opposed the development and use of fully autonomous weapons systems (see Figure 7a). 42% chose the

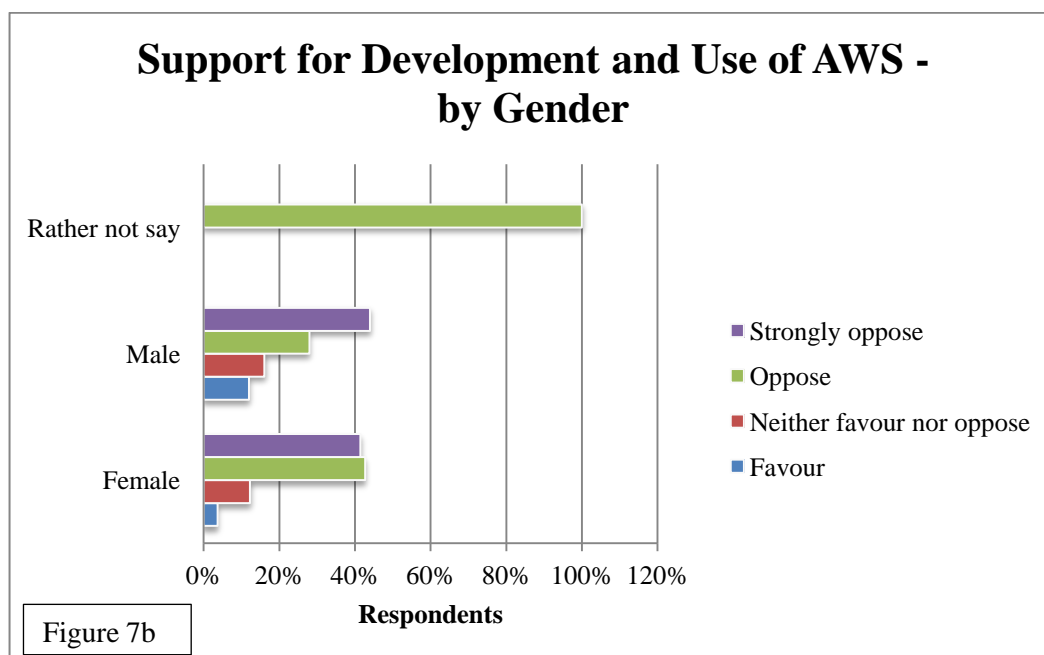
option “strongly oppose” while 40% selected “oppose”. “Neither favour nor oppose” was chosen by 13% and just 5% chose “favour”. Notably, nobody chose the option “strongly favour”. Overall, there was overwhelming opposition to the use and development of LAWS in this sample (82%). This demonstrates a similar trend to that found in previous studies, though the level of opposition was much higher compared with that identified in Carpenter’s (2013) poll (55%), the ORi (2015) online study (56%) and the Ipsos (2017) poll (56%). Levels of support for LAWS were correspondingly higher in these earlier studies too. This is perhaps reflective of the more restricted sample used in this survey, since it is comprised of a smaller number of respondents, all of which were university students who were predominantly young and female. Without other data available on the Greek public’s feelings about LAWS it is difficult to tell if this difference in opposition is due to nationality.



Previous surveys analysed support for LAWS by demographic variables. For example, the 2017 Ipsos poll found that men (29%) showed greater support for the use of AWS compared with women (20%). In this study, the difference between men and women’s support for LAWS was less significant (see Figure 7b). Slightly more men than women strongly opposed LAWS. However, more men (12%) favoured the development and use of LAWS than

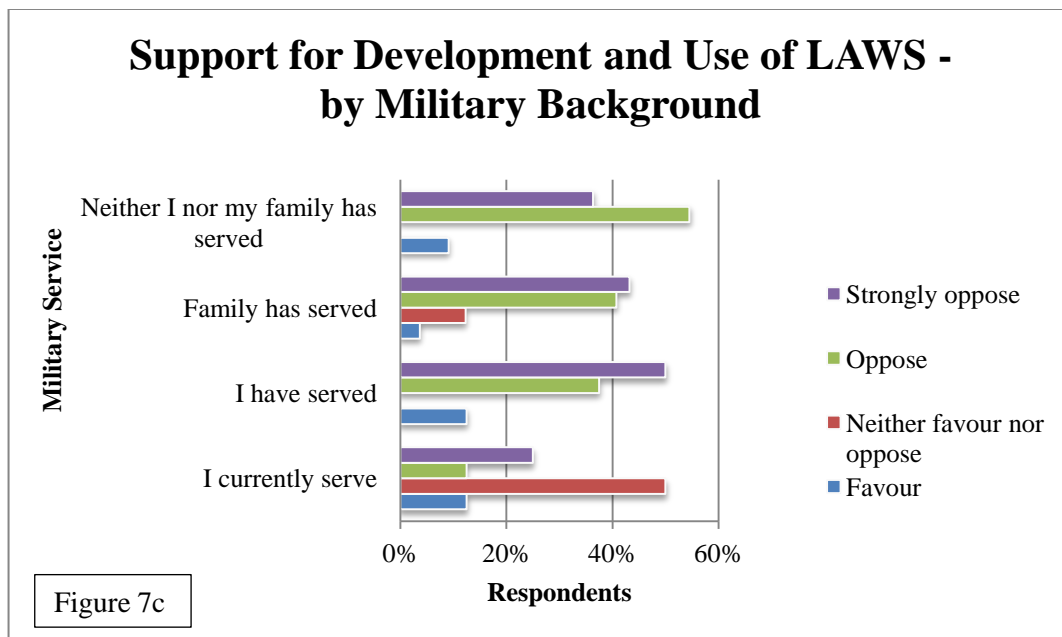
women (4%) and more women (43%) chose the option “oppose” compared with men (28%). One person chose not to identify as male or female and also opposed the use and development of LAWS.

Ipsos also found greater support for the development and use of fully autonomous weapons in the under-35 age category (29%) than those aged 50-64 (18%). Although this survey utilised different age categories, it sampled students so the age distribution was significantly narrower when compared with the Ipsos poll. However, it is interesting to note that all of the small number of respondents (9) who identified as over 35 years opposed or strongly opposed LAWS. Carpenter’s (2013) study found that respondents with higher levels of education had higher levels of opposition to AWS. Again, this being a survey of students meant that the distribution of the sample was more limited than her study. In fact, levels of opposition to LAWS were stable across the four ranges of highest attained education level given, from high school to doctorate or higher.



Carpenter (2013) found that opposition to AWS was highest amongst military personnel. The survey for this thesis showed that those who were currently serving (13%) or had previously served (13%) in the military actually showed the highest levels of support for the development and use of AWS (see Figure 7c). Also, those currently serving in the military showed the lowest levels of opposition to AWS (38%). The greatest opposition to AWS was expressed by respondents who had no connection to the military (91%) followed by those who had personally served in the past (87%). Although this does not seem to follow the results of Carpenter’s study, it must be noted that the number of respondents who were currently serving

or had served in the past was small (16) compared to the overall sample (108). This, combined with the issue of compulsory military service, might be the reason for the difference in results on this variable.

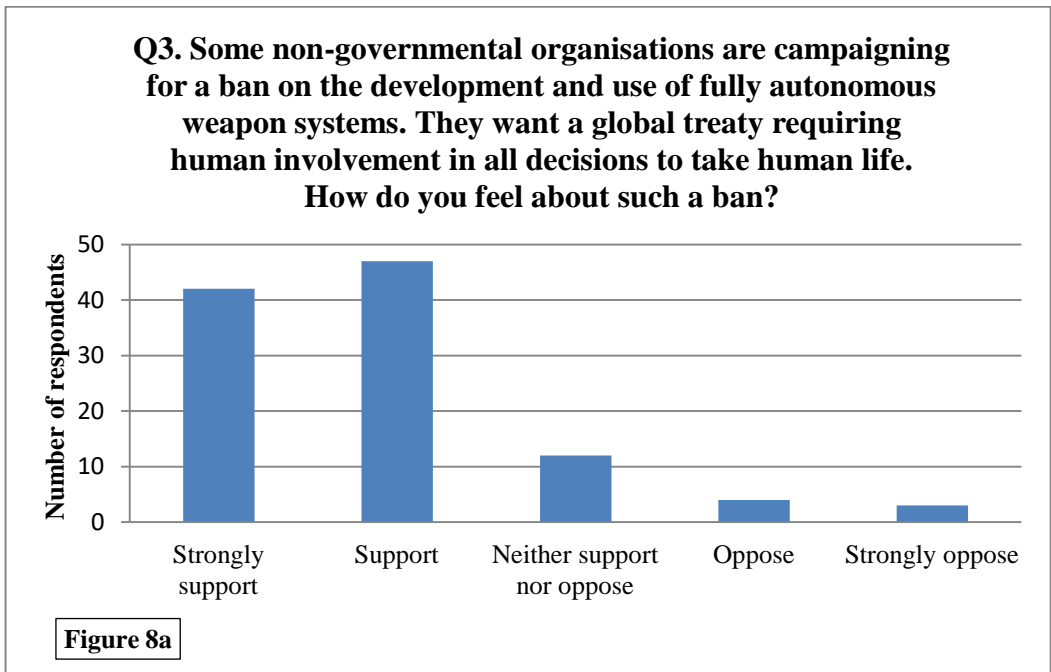


### 6.5. Support for a ban of LAWS

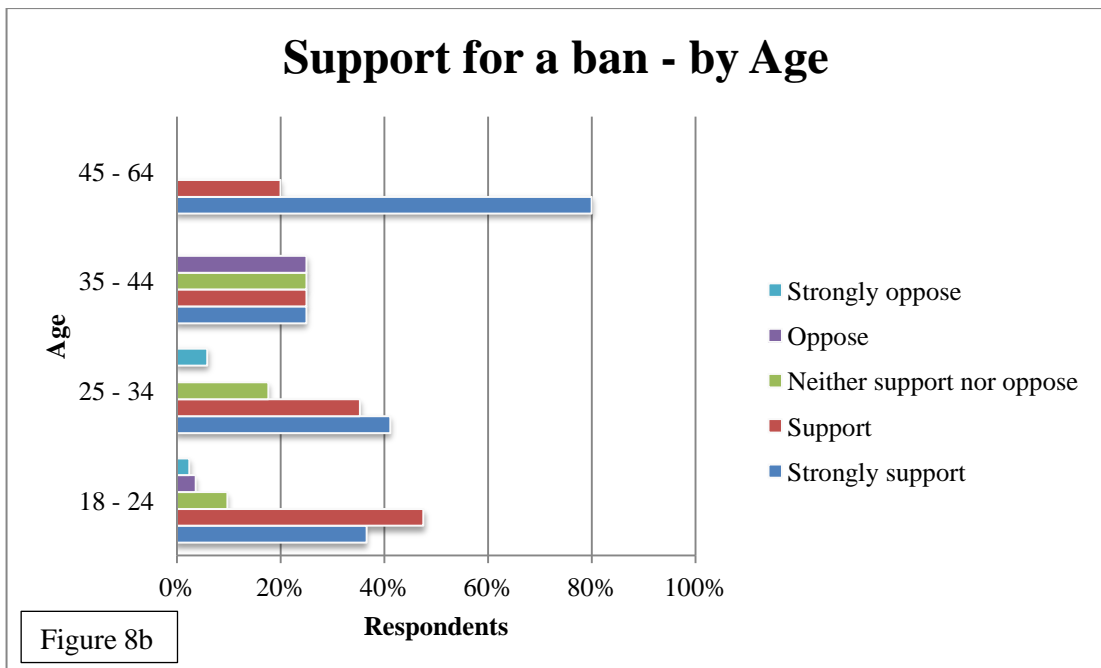
Question 3 of the survey aimed to test the second part of hypothesis 2. This predicted that once informed about LAWS, the majority of the public would support a ban on their development and use. It was based on the second question posed by Carpenter in her 2013 poll and informed respondents about the NGO campaign for a global ban on fully autonomous weapons. It asked their feelings about such a ban, giving options to choose from on a 5-point scale.

As predicted, the vast majority of respondents supported a ban on the development and use of fully autonomous weapons systems (see Figure 8). 39% chose the option “strongly support” while 43% selected “support”. “Neither favour nor oppose” was chosen by 11%. There was some opposition to the idea of a ban. 4% chose “oppose” and 3% chose “strongly oppose”. Overall though, there was overwhelming support for a global ban on the use and development of AWS in this sample (82%). Carpenter (2013) asked respondents about their feelings towards the civil society campaign rather than about a ban on LAWS, so the results are not directly comparable. However, it is worth noting that once again, the findings of this study were more emphatic than those identified in Carpenter’s poll. 53% of her respondents supported the Campaign compared with 82% of people who supported a ban in this survey.





There was no significant difference in levels of support for a ban among the varying levels of education attained. The same was true for respondents from different military backgrounds, although those with no connection to the military displayed the greatest levels of support for a ban (91%). Respondents aged 45-64 were the most supportive of a ban whereas the highest levels of opposition was found amongst those aged 35 – 44 (see Figure 8b). However, as the number of respondents in these age groups was a small fraction (9) of the overall sample (108), this cannot be seen as a reliable trend.



There was a little variation in levels of support for a ban based on gender (see Figure 8c). Significantly more men chose “strongly support” (52%) compared to women (35%) and no men selected “strongly oppose” which 4% of women did. However, overall levels of support were similar for men and women when the “strongly support” and “support” options were added together. Moreover, since many more women than men participated in this survey, there is a greater variation in their responses.

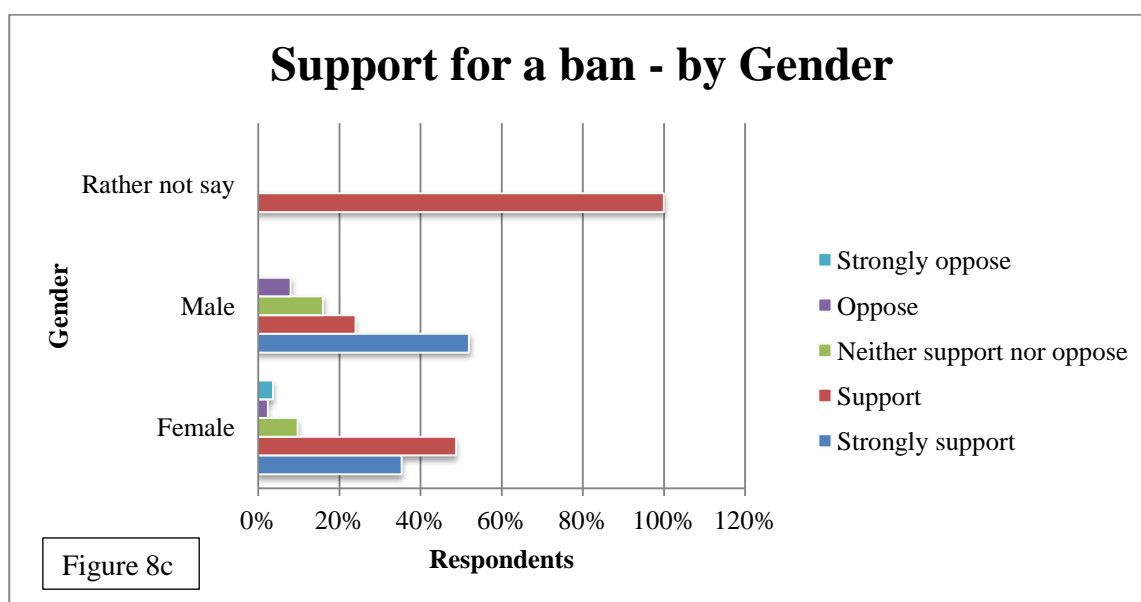


Figure 8c

## 6.6. Main reasons to support and reject LAWS

Questions 4a and 4b were posed in order to discover what issues people prioritised in the LAWS debate. The aim was to identify the core areas that the Campaign could focus on to increase public engagement. This section took questions from the ORi (2015) survey as their starting point, though the options provided for participants to select from were not exactly the same. Question 4a asked respondents to choose one option out of the six different ones provided as the main reason to support the development and use of LAWS. They were also offered the chance to select “other” and freely write their answer in case they felt that none of the six was appropriate. Question 4b used the same structure but asked respondents to choose what they thought was the main reason to reject the development and use of LAWS. The option to select “other” was also provided. The order of Q4a and Q4b was randomised to minimise bias.

The author arrived at the given options through reviewing the relevant literature and the previous surveys and through contact with the Campaign NGOs. Naturally, the choices offered to respondents and the way they were forced to choose just one option was a little artificial though, and some felt unable to select only one so wrote their own answers using the “other”

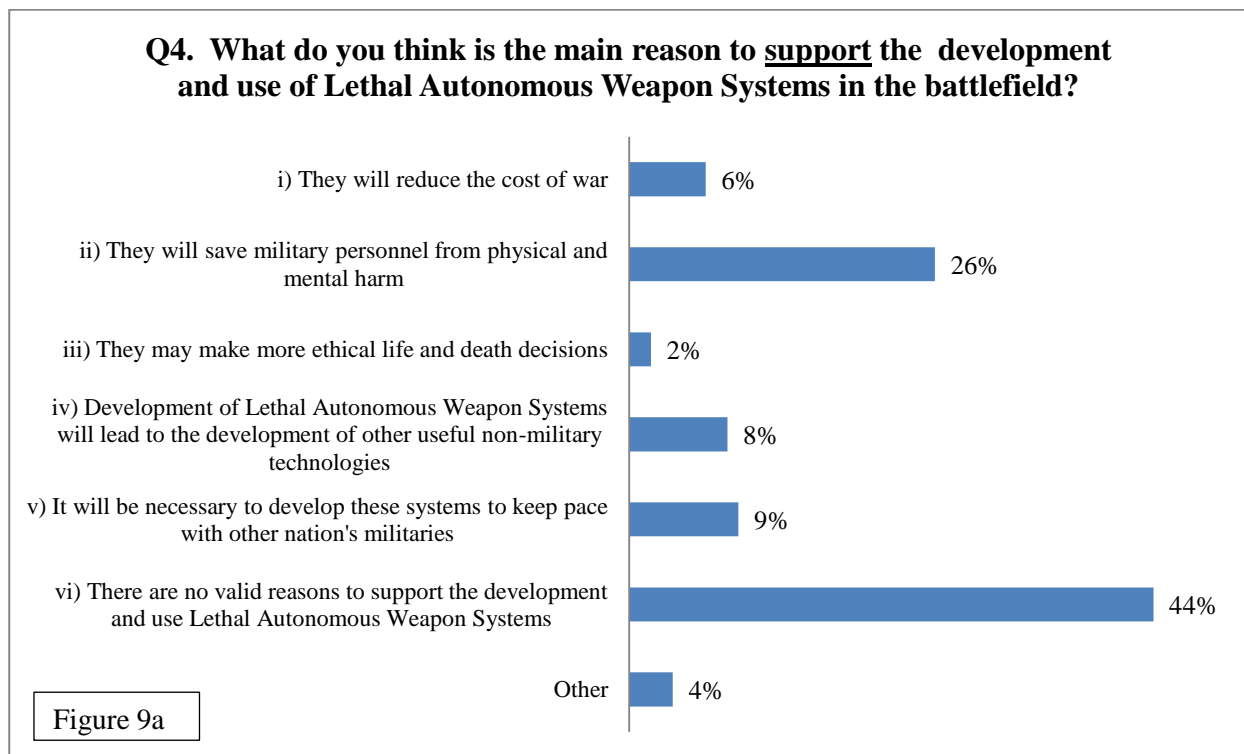
option. For Q4a, 4% of respondents chose to write their own answer, while 13% chose this option for Q4b, perhaps reflecting the more contentious nature of articulating the main reason to reject LAWS (see Figures 9a and 9b).

Question 4a sought to discover what most people thought of as the main reason to support the development and use of LAWS, if indeed there were any reasons at all. Overwhelmingly, people responded that there were in fact no valid reasons to support the development and use of LAWS (44%). This was similar to the response that the global ORi (2015) survey found. 32% of their respondents declared that there were no valid reasons for developing and using LAWS over ROWS (Remotely Operated Weapons Systems), which made it the most popular choice on their poll. The next most popular reason selected in the survey produced for this study was that LAWS would save military personnel from physical and mental harm (26%), which is one of the main reasons advanced by proponents of LAWS.<sup>20</sup> In the ORi poll, this reason was split in two, with one option for mental harm, and one for physical harm. Overall, 33% of respondents chose one of those two options, making it a slightly more popular choice than it was amongst the Greek respondents for this survey.

The third most popular reason given by respondents for this survey was that it will be necessary to develop LAWS to keep pace with other nation's militaries (9%). This option was not part of the ORi poll. However, it was similar to a condition used by Horowitz (2016) in his survey of US public opinion. He hypothesised that support for US development of AWS would increase when other states or non-state actors were developing the technology. His hypothesis appeared to be correct and led to "significant increases" (from 29% to 49%) in levels of support for the US development of AWS as well as pronounced decreases in opposition to their development. Naturally, it is difficult to compare the results of this study with that of Horowitz since the two questions are structured quite differently but it is interesting to note the relatively low levels of support for LAWS based on foreign development amongst the Greek respondents. The least-chosen option was that LAWS might make more ethical life and death decisions when compared with human combatants (2%). This implies that most of the respondents for this survey did not agree with the position of proponents like Arkin (2009), who predict that LAWS could eventually be more ethical than humans.

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<sup>20</sup> For further discussion of this issue, see Chapter 3 – Current Debates about LAWS.

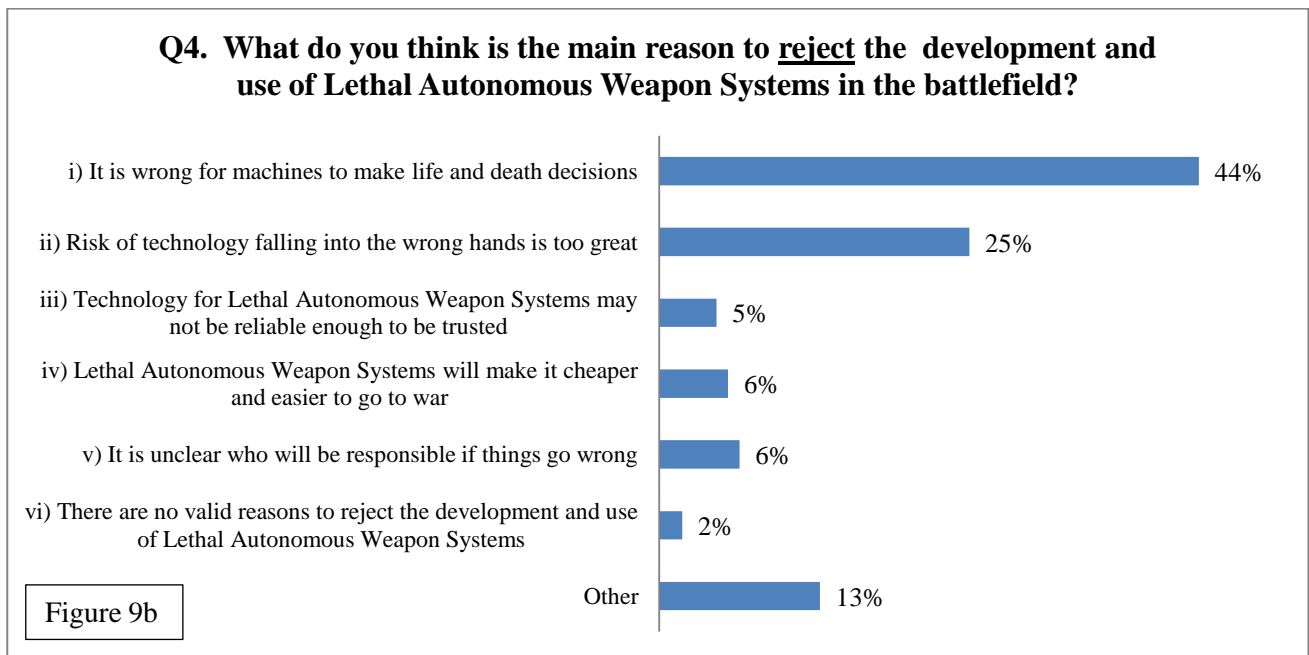


Question 4b asked respondents what they thought was the main reason to reject the development and use of LAWS. The distribution of the results was broadly similar to trends found by the ORi survey, with the most popular option for rejecting LAWS being that it is wrong for machines to make life and death decisions (44%). The ORi (2015) study phrased their option in a slightly different way, “Humans should always be the one to make life/death decisions” but it was also their most popular response for this question (34%). The next most selected option for this survey was that the risk of LAWS technology falling into the wrong hands would be too great (25%). This option was the third most popular in the global ORi poll at 14%. The second most popular option in the ORi study related to doubts that LAWS technology of the near future would be reliable enough to be trusted (20%), while on this survey that option was chosen by only 5% of participants, making it the second lowest choice. Concerns about who would be responsible if things went wrong and the potential for LAWS to make it cheaper and easier to go to war both garnered 6% of responses, placing them in joint fourth place. The ORi study did not include an option about LAWS lowering the threshold for engaging in war, but their option related to concerns about responsibility was more popular than it was in this study at 12%. Only 2% of people felt that there were no valid reasons to reject the development and use of LAWS, compared with 5% polled in the ORi survey.

13% of people chose to write their own answers for this question, making “other” the third most popular option. Three respondents wrote that they were not sure and two declared that all of the provided reasons for rejecting LAWS were equally valid. One declared that only

defensive systems would be acceptable, not ones whose only purpose was to take human life. Other written answers highlighted ethical and technical concerns, such as the conviction that economic and human resources would be better used for peaceful purposes, that it would be a mistake to exploit such advanced technology just to make lethal weapons and fears that LAWS might target civilians.

These results appear to support the narrative found in the Campaign's literature, namely that the general public will be uncomfortable with the concept of delegating life and death decisions to machines. They also seem to confirm the claims made by the NGOs contacted for this thesis. They were asked what they believed the public's biggest concern would be about fully autonomous weapons, based on their experience with the Campaign. Several different reasons were given, including lowering the threshold for going to war (M. Wareham, personal communication, May 7, 2018; Y. Sakurai, personal communication, June 29, 2018), fuelling an arms race and fears of the technology being used by non-state actors (Y. Sakurai, personal communication, June 29, 2018). Others highlighted more futuristic fears about the possibility of machines revolting against humans or "taking over", intuiting that such concerns were driven by the way that the media presents the issue (A. Pytlak, personal communication, June 3, 2018; F. Vignarca, personal communication, May 24, 2018; Y. Sakurai, personal communication, June 29, 2018). However, by far the most common reason cited by NGO individuals was the loss of human control over lethal targeting decisions (E. Hunt, personal communication, May 3, 2018; D. Kayser, personal communication, July 9, 2018; R. Moyes, personal communication, May 4, 2018; A. Pytlak, personal communication, June 3, 2018; F. Vignarca, personal communication, May 24, 2018). Erin Hunt described it thus, "Really the public's biggest concern is what we call the 'ick factor'. The 'ick factor' is that gut feeling people get when they hear about the idea of allowing algorithms to choose who lives and who dies on the battlefield" (personal communication, May 3, 2018).



### 6.7. Acceptable situations for the use of LAWS

Question 5 aimed to discover if there were any situations in which the use of LAWS would be acceptable to the public. The purpose of this question was to test some of the arguments made in the current debates about LAWS as well as the third and fourth hypotheses of this study. Hypothesis 3 predicted that support for some use of LAWS will increase when given varied contexts. This followed the findings of Horowitz's (2016) studies when public support for the development and use of LAWS increased when presented with different contexts. However, the situations provided in this study are not the same as Horowitz's but are instead based on the review of the relevant literature. Hypothesis 4 forecast that the overseas use of LAWS would be more popular than their domestic use. This took aspects of the ORi (2015) study as its starting point, though the question and provided options were quite different. The fourth hypothesis was also based on assumptions made in light of the continuing support amongst the US public for the use of armed drones to carry out targeted killings overseas. For example, in 2015, the Pew Research Center found that among 2002 adults, 58% approved of the US conducting drone strikes targeting extremists in countries such as Pakistan, Yemen and Somalia. This compared with 35% who disapproved of such attacks (Pew Research Center, 2015). Apparently then, in the US at least, significant support exists for using drones overseas so it would be interesting to discover if comparable levels of support exist for deploying LAWS in a similar fashion.

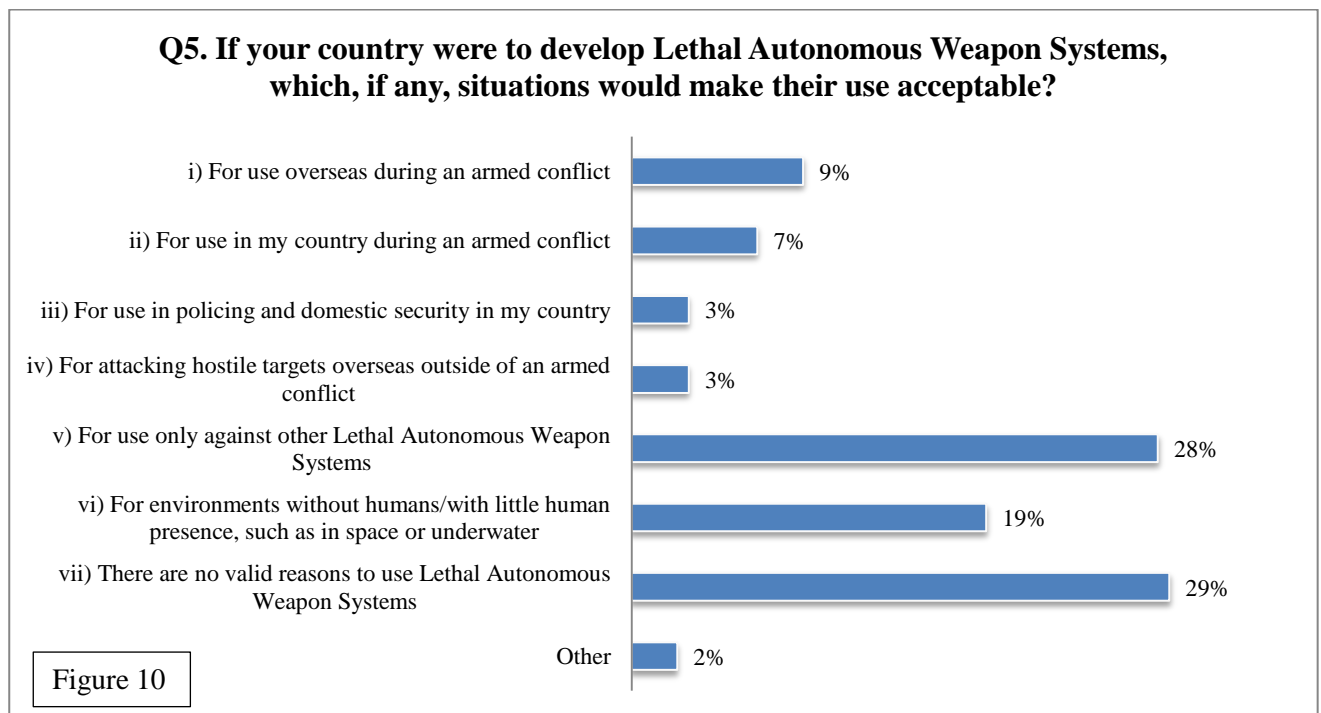
Respondents were asked to choose as many of the seven provided options for Question 5 as they felt were applicable (see Figure 10). They could also choose “other” and write their own answer. This resulted in more selected answers than the total number of participants. A total of 164 answers were given for this question. The most popular response was that there were no valid reasons to support the use of LAWS (29%). This is significantly lower than the 44% who reported that there were no valid reasons to support the development and use of LAWS when answering Question 4a. This seems to indicate that the third hypothesis was correct, namely that support for some use of LAWS would increase when given varied contexts.

The second most popular option was that LAWS should only be used against other LAWS (28%), followed by the option that they should only be used in environments with little, if any, human presence (19%). This implies that respondents believed that LAWS should not be responsible for targeting humans. It is interesting that these options garnered so much support since they are some of the main arguments used by proponents of LAWS (Anderson, Reisner, & Waxman, 2014, p. 406). For example, Vilmer (2015) claims it is a sophistry to invoke the principles of IHL if LAWS are only used in contexts where there are no civilians or civilian objects. However, as discussed in Chapter 3, such claims have been refuted on the grounds that it is highly unlikely that states would only deploy LAWS in human-free environments or against other autonomous robotic weapons (Geiss, 2015, p. 12; HRW & IHRC, 2014, pp. 9-10). Moreover, even if LAWS were only used against other LAWS, it could lead to unexpected and uncontrollable outcomes due to the “unpredictability of highly complex algorithms reacting to one another” (Geiss, 2015, p. 12). Nonetheless, there does indeed seem to be some public support for the use of LAWS in these limited situations based on the findings of this survey. Therefore, it might be useful for the Campaign and opponents of LAWS in general, to emphasise once again the reasons why these contexts are unlikely, in order to avoid such hypothetical situations being used to gain support for the development of this technology.

It is unclear whether the fourth hypothesis was confirmed by this survey. It predicted that overseas use of LAWS would be more popular than domestic deployment. 9% of people believed that it was acceptable to use LAWS overseas during an armed conflict compared to 7% for use in their own country in a similar situation which seems to suggest that the hypothesis might be correct. However, the difference is too marginal to draw any firm conclusions from it. Interestingly, the same amount of respondents (3%) supported the use of LAWS for domestic policing and security issues within their own country and for attacking hostile targets overseas outside of an armed conflict. Therefore, the findings related to

Hypothesis 4 remain inconclusive. Worthy of note is the fact that only 22% of the responses regarding the acceptable deployment of LAWS included their use against human targets (options i to iv), implying that the vast majority of people surveyed for this study did not support any the use of LAWS against humans, even when presented with different contexts.

Of the 2% of people who wrote their own answers, one reported that LAWS should only be used for defensive purposes, two were not sure and one felt that any use of LAWS would still result in the loss of human life.



## 6.8. Conclusions

Overall, most of the hypotheses proposed for this study were confirmed and the results followed previous trends identified in other surveys. Public awareness of LAWS was low, as was expected. Less than a third of respondents reported that they had heard of LAWS. Clearly, public engagement on an issue relies on awareness as people cannot support a movement that they do not know about. Several NGOs raised this issue too in their responses to this study (D. Kayser, personal communication, July 9, 2018; Y. Sakurai, personal communication, June 29, 2018; F. Vignarca, personal communication, May 24, 2018; M. Wareham, personal communication, May 7, 2018). So the first requirement to build support for a treaty prohibiting LAWS would be to raise public awareness.

However, as was also predicted, once informed of the nature of LAWS, opposition to their development and use was overwhelming, with 82% of respondents rejecting them. Similar



numbers of respondents expressed support for an internationally binding ban on fully autonomous weapons. Therefore, hypotheses 1 and 2 appeared to be correct and the NGOs beliefs that once the public are informed about LAWS, the majority will support a ban, were also borne out by the survey results (D. Kayser, personal communication, July 9, 2018; E. Hunt, personal communication, May 3, 2018; R. Moyes, personal communication, May 4, 2018; M. Wareham, personal communication, May 7, 2018). These results were similar but more emphatic than those found in previous surveys, perhaps indicative of the more limited sample utilised in this study. According to the respondents, by far the most important reason for rejecting LAWS was that machines should not make life and death decisions, which appears to support claims made by opponents of LAWS about them threatening human dignity and potentially violating the Martens Clause (Heyns, 2013, p. 17; Heyns, 2016b, p. 5; ICRC, 2018, p.2; PAX, 2015). Finally, although there was a notable decrease in respondents' direct opposition to LAWS when presented with varied contexts for their use, the vast majority of people still did not want autonomous weapons to be responsible for lethal decision-making.

## 7. Conclusion

This thesis has explored the current debates regarding LAWS and concluded that a prohibition on their development and use is both necessary and desirable to ensure the protection of human rights and uphold international law. It has outlined the international political situation, found that progress was advancing slowly due to the differing positions of states and focussed on the important role that civil society has in achieving a ban. Examining previous successful weapons bans led to the conclusion that one of the areas where civil society could have the most impact is public opinion and engagement with the LAWS debate. Given that the Martens Clause states that new weapons must not run counter to “the principles of humanity” and the “dictates of the public conscience” (ICRC, 1977, Art. 1), many have argued that it is essential to establish public sentiments towards the use of LAWS. Strong opposition to LAWS from a well-informed public would present states with a compelling reason to work towards a global, legally-binding ban. Therefore, the central research question driving this study was “How can civil society engage the public on LAWS and gain support for an international ban on their development and use?” In order to analyse this question and its related hypotheses,<sup>21</sup> a public opinion survey was undertaken. It sought to discover current levels of awareness of LAWS and attitudes towards their development and use among Greek speaking students. To the author’s knowledge, a similar study has not been carried out in the Greek language so far. Therefore, the knowledge gained from this study should add value to the limited body of existing research undertaken about public opinion on LAWS.

This survey and the thesis as a whole benefited from the invaluable insights gathered from seven individuals working with NGOs involved in the Campaign to Stop Killer Robots. This knowledge, collected through an interview and email questionnaires, informed the structure of the survey. Primary data generated through the final set of 108 completed public opinion surveys led to the conclusion that the first two hypotheses were correct. These predicted that levels of awareness of LAWS would be low but once people were informed about the nature of these weapons, opposition to their development and use would be strong, as would support for a ban. The results showed that only 28% of respondents reported having heard of LAWS. Once provided with a definition of fully autonomous weapons systems, 82% opposed their development and use and the same percentage supported a global ban. This trend is consistent with what has been found in previous studies of public opinion in other countries, though the reaction against LAWS and in favour of a ban was much more pronounced in this study. This is perhaps indicative of the narrower sample utilised for this survey, since it was

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<sup>21</sup> See Chapter 5 for the hypotheses used in this study.

comprised wholly of university students, the majority of whom were 18-24 years old and female. More research is therefore needed to discover if these trends are consistent across the wider Greek population and those of other countries.

The survey found that the main reason cited by respondents to support LAWS was the protection of military personnel from mental and physical harm, at 26%. This is one of the major arguments made in favour of developing LAWS technology, though it has been refuted on the grounds that unmanned armed drones already fulfil the function of removing combatants from the battlefield whilst retaining human control over the critical functions. Therefore, it may be useful for those involved in the Campaign to reiterate such counter-arguments and ensure they reach the general public. Overall though, the majority of respondents declared that there were no reasons to support the development and use of LAWS, even when provided with potential benefits of their use, including financial and security reasons. This was similar to trends found in the earlier global ORi (2015) poll, indicating that this is potentially a widely held view throughout the world and one which deserves further study.

Another striking trend identified by this study was the overwhelming rejection of LAWS (by 44% of respondents) on the grounds that it is wrong for machines to make life and death decisions. This confirmed the expectations of those NGOs contacted for this study and was broadly in line with the findings of the ORi (2015) poll. It connects with the idea that maintaining meaningful human control over weapons is essential to avoid violating human dignity, a major concept found throughout the LAWS debates. This deontological argument, rooted in ethical concerns, counters the consequentialist reasoning of LAWS proponents since it means that fully autonomous weapons could never be acceptable for lethal use against humans, even if they were able to reduce civilian casualties. If further research into public opinion supports these results they could form a solid basis for invoking the Martens Clause as a reason to prohibit LAWS.

A quarter of respondents to this survey cited the risk of autonomous weapons technology falling into the wrong hands as the main reason to reject LAWS, making it the second most popular choice. Most probably this reflects concerns stimulated by the current political climate and extensive media coverage of the actions of IS (Islamic State) and other violent non-state actors. This outcome is also in line with the expectations of the Campaign NGOs (Y. Sakurai, personal communication, June 29, 2018) and the ORi (2015) poll and featured as a major concern in the relevant literature. Undoubtedly, should LAWS technology proliferate and become widely available, individuals and non-state actors will try to attain it.

These circumstances were vividly illustrated in a short film commissioned by The Future of Life Institute in 2017. 'Slaughterbots' (Stop Autonomous Weapons, 2017) portrayed a dystopian near-future scenario in which individuals and non-state actors targeted people using swarms of LAWS and could not be challenged or traced, leaving government forces powerless to prevent mass targeted killings. Consequently, this might be an area that the Campaign and other supporters of a ban should continue to highlight, since it appears to be a major concern for the public. Of course, more research is needed to ensure the validity of this finding and to see if it is broadly applicable.

This study indicates that hypothesis 3 is true. It predicted that support for some use of LAWS would increase when given varied contexts. However, the uses for which most respondents were willing to see LAWS employed excluded their deployment against humans, accepting instead just their use against other LAWS or in human-free environments. These hypothetical situations have been used by proponents of LAWS as reasons to reject a ban, since the rules of IHL would not apply due to the absence of people. However, critics have explained it is unlikely that LAWS would only be used in this limited way. It is recommended therefore, that the Campaign and its allies should emphasise once more why these contexts are unlikely, so that the public can make well-informed decisions. The fourth hypothesis, which forecast that the overseas use of LAWS would be more popular than their domestic use, was not conclusively confirmed or disproven and further research should be undertaken to discover if a reliable trend exists. More research should also be carried out to verify the validity of hypothesis 3, extending the study to a wider sample.

Overall, most of the hypotheses of this study and the expectations of those working with the Campaign appear to be correct. Once informed about LAWS, most people will oppose them and support a ban on their development and use, which bodes well for the aims of the Campaign. However, as Mary Wareham the Campaign's coordinator explained, public support is only part of the solution and other aspects, such as gaining further state support, particularly from P5 UN Security Council members, achieving changes to national legislation and building stronger partnerships with those in the private sector who might work on these technologies is also needed (personal communication, May 7, 2018). Nonetheless, a well-informed and engaged public that expresses strong opposition to the development and use of LAWS would be a formidable ally for the Campaign, may help to confirm the public conscience concerns outlined under the Martens Clause and would apply pressure to governments to take action.

A lack of resources was identified by the Campaign NGOs as a major barrier to public engagement, though they stated they have recently secured more funding and plan to launch the second phase of their campaign. Regarding the central research question of this thesis, there are various steps civil society can take to engage the public on LAWS and gain support for an international ban on their use and development. Firstly, levels of public awareness need to be raised as without awareness there can be no engagement. Publicity and campaigns need to be focused on the public's core concerns about LAWS to overcome the limited bandwidth of attention available for issues. Some of these core concerns have been identified in this study and further research should be undertaken to discover if these trends hold true. According to many of the Campaign NGOs, one of the major obstacles to gaining the public's attention is the speculative nature of LAWS. Since fully autonomous weapons do not exist yet there is no sense of urgency among the public or policymakers. Grounding this as an imminent concern and emphasising the benefits of a pre-emptive ban should therefore also feature prominently in any public engagement strategy.

Although this was a limited study of public attitudes towards LAWS, its results are still indicative of wider trends, illuminate the opinions of a group that has not been consulted before and form a useful guide for further research. Had greater time and resources been available, more reliable results might have been produced by utilising a two-step process, exploring the issues first with open questions in focus groups or interviews and using the answers to create options for the main survey. This approach is therefore advised for future studies. It would also be interesting to recreate this study in other university populations, both within Greece and other countries too, including those in the Global South, to discover if the results are comparable or not. This would simultaneously help to raise awareness of LAWS among student populations, a useful side effect since it will be the younger generation that will have to meet the challenges presented by LAWS should they not be prohibited.

Moving the discussions on the acceptable use of LAWS outside the realm of politicians, lawyers, experts and activists and into the sphere of the general public could be an important step towards preventing the bleak future of death by algorithm.

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## Appendix A: Public opinion survey in English

### Public opinion of Lethal Autonomous Weapon Systems

A short survey about Lethal Autonomous Weapon Systems.

#### Part 1

#### What is your age?

18 - 24

25 - 34

35 - 44

45 - 64

65 or older

#### What is your gender?

Female

Male

Prefer not to say

#### What is your nationality?

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#### What is your highest level of education?

High school or less

Bachelors degree (in progress/ completed)

Masters Degree (in progress/ completed)

Doctorate or higher (in progress/ completed)

#### What is your area of study?

---

## Part 2

1. Have you heard of Lethal Autonomous Weapons?

Yes

No

I'm not sure

## Part 3

2. Drones are robotic weapons which are remotely operated by a human controller. Several nations are currently developing robotic weapons that can independently make targeting and firing decisions without any human intervention. How do you feel about the development and use of completely autonomous weapon systems?

- Strongly favour
- Favour
- Neither favour nor oppose
- Oppose
- Strongly oppose

## Part 4

3. Some non-governmental organisations are campaigning for a ban on the development and use of fully autonomous weapon systems. They want a global treaty requiring human involvement in all decisions to take human life. How do you feel about such a ban?

- Strongly support
- Support
- Neither support nor oppose
- Oppose
- Strongly oppose

## Part 5

Definition: Lethal Autonomous Weapon Systems are robotic weapons that can independently make targeting and firing decisions without any human intervention.

### 4. What do you think is the main reason to support/reject the development and use of Lethal Autonomous Weapon Systems in the battlefield?

#### REASONS TO SUPPORT

- i) They will reduce the cost of war.
- ii) They will save military personnel from physical and mental harm.
- iii) They may make more ethical life and death decisions.
- iv) Development of Lethal Autonomous Weapon Systems will lead to the development of other useful non-military technologies.
- v) It will be necessary to develop these systems to keep pace with other nation's militaries.
- vi) There are no valid reasons to develop and use Lethal Autonomous Weapon Systems.
- Other: \_\_\_\_\_

---

#### REASONS TO OPPOSE

- i) It is wrong for machines to make life and death decisions.
- ii) Risk of technology falling into the wrong hands is too great.
- iii) Technology for Lethal Autonomous Weapon Systems may not be reliable enough to be trusted.
- iv) Lethal Autonomous Weapon Systems will make it cheaper and easier to go to war.
- v) It is unclear who will be responsible if things go wrong.
- vi) There are no valid reasons to reject the development and use of Lethal Autonomous Weapon Systems.
- Other: \_\_\_\_\_

## Part 6

Definition: Lethal Autonomous Weapon Systems are robotic weapons that can independently make targeting and firing decisions without any human intervention.

5. If your country were to develop Lethal Autonomous Weapon Systems, which, if any, situations would make their use acceptable? (Please choose all that apply)

- i) For use overseas during an armed conflict.
- ii) For use in my country during an armed conflict.
- iii) For use in policing and domestic security in my country.
- iv) For attacking hostile targets overseas outside of an armed conflict.
- v) For use only against other Lethal Autonomous Weapon Systems.
- vi) For environments without humans/with little human presence, such as in space or underwater.
- vii) There are no valid reasons to use Lethal Autonomous Weapon Systems
- Other: \_\_\_\_\_

## Final Section

### **What is your military background?**

- I am currently serving in the military.
- I have served in the military in the past.
- At least one member of my family is/has been in the military.
- Neither I nor my family members have served in the military.

**Thank you for participating in this survey.**



## Appendix B: Public opinion survey in Greek

## Κοινή γνώμη σχετικά με τα Φονικά Αυτόνομα Οπλικά Συστήματα

Μια σύντομη έρευνα σχετικά με τα Φονικά Αυτόνομα Οπλικά Συστήματα.

### Μέρος 1<sup>ο</sup>

**Ποια είναι η χώρα καταγωγής σας;**

---

**Ποια είναι η ηλικία σας; \***

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 64
- 65 ή μεγαλύτερη

**Ποιο είναι το αντικείμενο των σπουδών σας; \***

---

**Ποιο είναι το φύλο σας;**

- Θήλυ
- Άρρεν
- Προτιμώ να μην απαντήσω

**Ποιο είναι το ανώτατο επίπεδο εκπαίδευσής σας; \***

- Λύκειο ή χαμηλότερο
- Πτυχίο (εν εξελίξει / ολοκληρωθέν)
- Μεταπτυχιακό (εν εξελίξει / ολοκληρωθέν)
- Διδακτορικό ή ανώτερο (εν εξελίξει / ολοκληρωθέν)

## Μέρος 2<sup>ο</sup>

1. Έχετε ακούσει για τα Φονικά Αυτόνομα Οπλικά Συστήματα; \*

Ναι

Όχι

Δεν είμαι σίγουρος/-η

## Μέρος 3<sup>ο</sup>

2. Τα drones (τηλεκατευθυνόμενα αεροσκάφη) είναι ρομποτικά όπλα τα οποία χειρίζεται εξ αποστάσεως άνθρωπος-χειριστής. Σήμερα, διάφορα έθνη αναπτύσσουν ρομποτικά όπλα τα οποία μπορούν να λαμβάνουν ανεξάρτητα αποφάσεις στόχευσης και πυροβολισμού, χωρίς ανθρώπινη παρέμβαση. Ποια η στάση σας απέναντι στην ανάπτυξη και χρήση πλήρως αυτόνομων οπλικών συστημάτων;

- Σθεναρά υπέρ
- Υπέρ
- Ούτε υπέρ ούτε κατά
- Κατά
- Σθεναρά κατά

## Μέρος 4<sup>ο</sup>

3. Ορισμένοι μη κυβερνητικοί οργανισμοί οργανώνουν εκστρατείες κατά της ανάπτυξης και χρήσης πλήρως αυτόνομων οπλικών συστημάτων. Επιθυμούν την υπογραφή μιας διεθνούς συνθήκης με την οποία θα απαιτείται η ανθρώπινη παρέμβαση για τη λήψη αποφάσεων που αφορούν στην αφαίρεση ανθρώπινης ζωής. Ποια η στάση σας απέναντι σε μια τέτοια απαγόρευση; \*

- Σθεναρά υπέρ
- Υπέρ
- Ούτε υπέρ ούτε κατά
- Κατά
- Σθεναρά κατά

## Μέρος 5<sup>ο</sup>

Ορισμός: Τα Φονικά Αυτόνομα Οπλικά Συστήματα είναι ρομποτικά όπλα τα οποία λαμβάνουν αποφάσεις στόχευσης και πυροβολισμού χωρίς ανθρώπινη παρέμβαση.

### 4. Ποιος είναι κατά τη γνώμη σας ο βασικός λόγος για την υποστήριξη/απόρριψη της ανάπτυξης και χρήσης Φονικών Αυτόνομων Οπλικών Συστημάτων στο πεδίο μάχης;

#### ΚΥΡΙΟΙ ΛΟΓΟΙ ΥΠΟΣΤΗΡΙΞΗΣ

- i) Θα μειώσουν το κόστος του πολέμου.
- ii) Θα γλιτώσουν το στρατιωτικό προσωπικό από σωματική και πνευματική βλάβη.
- iii) Ενδεχομένως θα λαμβάνουν πιο ηθικές αποφάσεις περί ζωής και θανάτου.
- iv) Η ανάπτυξη Φονικών Αυτόνομων Οπλικών Συστημάτων θα οδηγήσει στην ανάπτυξη άλλων χρήσιμων τεχνολογιών μη στρατιωτικής φύσεως.
- v) Η ανάπτυξη των εν λόγω συστημάτων θα είναι απαραίτητη, ούτως ώστε να συμβαδίζουν με το στρατό άλλων εθνών.
- vi) Δεν υπάρχουν βάσιμοι λόγοι για την ανάπτυξη και χρήση Φονικών Αυτόνομων Οπλικών Συστημάτων.
- Άλλο: \_\_\_\_\_

#### ΚΥΡΙΟΙ ΛΟΓΟΙ ΑΠΟΡΡΙΨΗΣ

- i) Είναι λάθος να λαμβάνονται αποφάσεις περί ζωής και θανάτου από μηχανές.
- ii) Ο κίνδυνος να πέσει η τεχνολογία στα λάθος χέρια είναι εξαιρετικά μεγάλος.
- iii) Η τεχνολογία που χρησιμοποιείται για τα Φονικά Αυτόνομα Οπλικά Συστήματα ενδέχεται να μην είναι τόσο αξιόπιστη ώστε να εμπνεύσει εμπιστοσύνη.
- iv) Τα Φονικά Αυτόνομα Οπλικά Συστήματα θα καθιστούν φθηνότερη και οικονομικότερη την εμπλοκή σε πόλεμο.
- v) Είναι ασαφές το ποιος θα είναι υπεύθυνος εάν τα πράγματα δεν εξελιχθούν σωστά.
- vi) Δεν υπάρχουν βάσιμοι λόγοι για την απόρριψη της ανάπτυξης και χρήσης Φονικών Αυτόνομων Οπλικών Συστημάτων.
- Άλλο: \_\_\_\_\_

## Μέρος 6<sup>ο</sup>

Ορισμός: Τα Φονικά Αυτόνομα Οπλικά Συστήματα είναι ρομποτικά όπλα τα οποία λαμβάνουν αποφάσεις στόχευσης και πυροβολισμού χωρίς ανθρώπινη παρέμβαση.

5. Εάν η χώρα σας επρόκειτο να αναπτύξει Φονικά Αυτόνομα Οπλικά Συστήματα, ποιες από τις ακόλουθες καταστάσεις – αν όχι καμία - θα έκαναν τη χρήση τους αποδεκτή;

(Παρακαλώ επιλέξτε κάθε επιθυμητή απάντηση)

- i) Για χρήση στο εξωτερικό κατά τη διάρκεια ένοπλης σύρραξης
- ii) Για χρήση εντός της χώρας μου κατά τη διάρκεια ένοπλης σύρραξης
- iii) Για χρήση σχετική με την δημόσια τάξη και την εσωτερική ασφάλεια στη χώρα μου
- iv) Για επίθεση εναντίον εχθρικών στόχων στην αλλοδαπή εκτός ένοπλης σύρραξης
- v) Για χρήση μόνο ενάντια σε άλλα Φονικά Αυτόνομα Οπλικά Συστήματα
- vi) Για περιβάλλοντα χωρίς ανθρώπους/με ελάχιστη ανθρώπινη παρουσία, όπως λ.χ. στο διάστημα ή υποθαλάσσια
- vii) Δεν υπάρχουν βάσιμοι λόγοι για τη χρήση Φονικών Αυτόνομων Οπλικών Συστημάτων
- Άλλο: \_\_\_\_\_

## Τελική Ενότητα

Ποιο είναι το στρατιωτικό σας υπόβαθρο; \*

- Υπηρετώ στο στρατό την τρέχουσα περίοδο.
- Έχω υπηρετήσει στο στρατό στο παρελθόν.
- Τουλάχιστον ένα μέλος της οικογένειάς μου υπηρετεί/έχει υπηρετήσει στο στρατό.
- Ούτε εγώ ούτε τα μέλη της οικογένειάς μου έχουμε υπηρετήσει στο στρατό.

**Σας ευχαριστώ για τη συμμετοχή στην παρούσα έρευνα.**

## Appendix C: List of NGO respondents and question guide

Erin Hunt  
Mines Action Canada  
Email response: May 3, 2018

Daan Kayser  
PAX (The Netherlands)  
Email response: July 9th, 2018

Richard Moyes  
Article 36 (UK)  
Email response: May 4, 2018

Allison Pytlak  
Reaching Critical Will - Women's International League for Peace and Freedom (WILPF)  
(USA)  
Email response: June 3, 2018

Yuki Sakurai  
AAR Japan  
Email response: June 29, 2018

Francesco Vignarca  
Rete Disarmo (Network on Disarmament) (Italy)  
Email response: May 24, 2018

Mary Wareham  
Amnesty international (USA)  
Skype interview: May 7, 2018

Questions posed to NGO individuals:

1. Currently, what do you consider to be the greatest barrier to achieving new international law prohibiting the development and/or use of fully autonomous weapon systems (i.e. weapons that can select a target and fire without meaningful human intervention)?
2. What do you believe is the level of awareness about fully autonomous weapon systems in your country (and/or globally)?
3. What do you believe is the main obstacle:
  - a) to raising public awareness in your country (and / or internationally)?
  - b) gaining public support for a ban on fully autonomous weapon systems?



4. In your experience with the Campaign, what have you found to be the public's biggest concern regarding fully autonomous weapon systems?

5. Anything you would like to add?