The Cambridge "Academic-Military Complex"

A Report By:

DEMILITARISE CAMBRIDGE

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With a Forword by
Andrew Feinstein
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Foreword

Congratulations to Demilitarise Cambridge on the publication of this extremely important report on the Military-Academic Complex at Cambridge University.

The global trade in weapons is not only the most corrupt of all trades, it is also the most harmful and amongst the least regulated. It causes death, destruction and immiseration across the globe, while undermining the rule of law, democracy and socio-economic priorities in the buying and selling countries.

The arms trade accounts for around 40% of all corruption in world trade. Not only is this corruption a monumental waste of limited resources that could be used for crucial socio-economic needs, but it corrupts our political and legal processes, with individual politicians and political parties amongst the primary beneficiaries. These gargantuan bribes are paid not only in the purchasing country but also in the selling country, in what we describe as the feedback principle. For example, in the UK when BAE Systems paid £6 billion pounds of bribes on the most corrupt commercial transaction in history - the Al Yamamah arms deal with Saudi Arabia - British corporate executives, intermediaries, politicians and political parties received material benefits.

This not only corrodes our democracies, but because the trade takes place behind a veil of national-security imposed secrecy, it operates with impunity, undermining the rule of law and the accountability of our governments. To protect themselves, political leaders exert immense pressure on law-enforcement and prosecutorial bodies to ignore arms trade malfeasance. In addition, because they are benefiting materially and politically, our governments propogate military rather than diplomatic solutions to differences and disputes.

In my own country, South Africa, BAE Systems, with help from Tony Blair and Prince Andrew, paid £115 million of bribes to win a contract for which they were not even short-listed. It was the point at which the newly democratic South Africa lost its moral compass. But even worse, this spending on weapons the country neither required nor has used, resulted in a lack of fiscal resources to provide desperately needed housing, education and healthcare. In fact, a Harvard University study, suggests that the decision to prioritise arms over the provision of antiretroviral medication resulted in the avoidable deaths of at least 365,000 South Africans over the following 5 years, and the birth of 32,000 HIV-positive babies a year for the same period.

Even in instances of extreme need on the part of civilian populations, such as in Ukraine currently, arms companies continue to profiteer by the imposition of significant premiums. A recent investigation indicates that weapons being made available to Ukraine are being sold at an average premium of 30% over their price in non-conflict regions.

And, of course, British weapons are regularly used to kill innocent civilians. In the last eight years around 20,000 innocent Yemenis have been killed using primarily British and American weapons. They did not die as collateral damage but have been intentionally targeted by the Saudis in violation of international humanitarian law, and in possible war crimes. The Saudis have been advised by British military personnel on, amongst other things, targeting. When the Appeal Court ruled arms sales to Saudi Arabia unlawful because of these violations, the government decided to ignore the court decision and continue these murderous exports.

These weapons sadly do not make us any safer. In fact, many of them are either inappropriate for purpose or don't work: the most expensive weapons system ever produced, the F35 jet fighter, was declared unfit for purpose by a US Inspector-General.
Our record military budgets also ensure that we spend so much less on the greatest threats to humanity: food scarcity, inequality, global health pandemics and the climate catastrophe to which the military is the biggest institutional contributor.

This report highlights that during financial year 2020-2021 Cambridge University accepted grants worth over £2.5 million from the world's most corrupt company, BAE Systems, as well as Rolls-Royce which, according to the BBC 'bribes its way around the world', and Boeing. By so doing the university, which I proudly attended, has besmirched its reputation and endorsed values of corruption, socio-economic wastage, climate despoilation, and the undermining of democracy and the rule of domestic and international law.

It is way past time that Cambridge University demilitarised, for the sake of its students, academics and its reputation as an institution committed to the betterment of humanity.

Andrew Feinstein
(Author 'The Shadow World: Inside the Global Arms Trade', former ANC MP)

1). Introduction

Far from functioning as an institution that produces ethical research for social good, the University of Cambridge has become increasingly, and systematically, militarised. The fervent marketisation of UK higher education in recent decades has coincided with the emergence of numerous structures within the university which support companies manufacturing some of the world's deadliest military technologies. In section 3 of this report we will encounter how marketised structures within the university are frequently the means by which arms companies infiltrate higher education bodies.

There are several reasons why arms and military companies actively foster connections with universities like Cambridge:

> (i) Association with universities aims to socially, culturally and politically legitimise arms companies (or, as they call themselves, 'defence' or 'security' companies) as they attempt to position themselves as respectable and necessary.
>
> (ii) Universities directly assist arms companies with research and consultation which improves their operational capabilities.
>
> (iii) Arms companies target universities for recruitment.

The construction of the Cambridge military-academic complex is, therefore, a targeted attempt by arms companies to establish themselves in the functions and structures of the university.

This report will use the University of Cambridge as a case study of how successfully the arms industry has infiltrated UK universities and other public bodies, and how far the university has strayed from its 'mission' to 'contribute to society through the pursuit of education, learning and research'.[1] As its research continues to be conducted in active collaboration with arms companies and governmental military agencies, the university has become directly complicit in social and ecological harms across the world. For instance, the university has maintained close links with BAE Systems for over 20 years, a company whose technology has enabled the Saudi-coalition bombing of Yemen, in which at least 18,000 Yemenis have been killed by Saudi airstrikes. Many of BAE's actions have been condemned by numerous human rights organisations as war crimes, in which, by fostering such a collaborative relationship, the university has become complicit.

Before we investigate the Cambridge military-academic complex, we must answer a more basic question: why is it that the presence of arms companies has been tolerated within the university for so long?

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1 https://www.cam.ac.uk/about-the-university/how-the-university-and-colleges-work/the-universitys-mission-and-core-values#:~:text=The%20mission%20of%20the%20University,highest%20international%20levels%20of%20excellence

Academic language and separating research from its application

Cambridge's relationship with arms companies is not common knowledge, but nor is it - in most cases - concealed or kept out of the public eye. Even though much of the research profiled in this report takes place in research centres away from the central university grounds, as we will see, arms companies have come to collaborate with a significant proportion of STEM faculties, and many students are familiar with the university's corporate partners.

Rather, these relationships often avoid scrutiny by using academic language to ensure that the research conducted by the university is disconnected from its industrial application. BAE Systems, of course, does not manufacture fighter jets on Cambridge campuses, but the research conducted by Cambridge enables the development of more effective military technology and helps arms companies to be more profitable. Many of the collaborations we cover in this report are justified with the language of 'efficiency' but what they are making more efficient is rarely mentioned.

These arms companies market themselves as 'defence' or 'security' companies, implying that research conducted on their behalf will contribute towards 'protecting' people or nations. As we will see, many of these companies have received massive profits from enabling wars of aggression, or 'defending' the interests of oppressive regimes, such as Boeing and BAE System's provision of technology to assist Israel's bombing of occupied Gaza.

Such language undermines the idea that accountable and transparent research is conducted for the public good in Cambridge, and conceals the complicity of both Cambridge and the arms companies themselves in war crimes and neo-colonialism across the world.

The arms industry and neo-imperialism

It is not just ignorance of militarised research which props-up the presence of arms companies in Cambridge. There are some who suggest that the presence of arms companies is unavoidable, despite being aware of the violence committed by the customers of companies like Rolls-Royce and BAE Systems. While it is clear that most UK universities face a lack of government funding for research, it is misleading to state that the richest university in Europe requires these funds. Even if this were true, what such an argument is really saying is that the people killed by BAE or Boeing products - people who predominantly live in the Global South - do not matter enough to warrant cutting ties with such companies; or, at least, that they are an acceptable 'cost' to maintaining research output. This is what we mean when we suggest that the university's collaborations with arms companies are a neo-imperial project: the vast profits enjoyed by companies like Rolls-Royce and Lockheed Martin are sustained by the suffering of people in the Global South.

The university recently undertook a 'Legacies of Enslavement' enquiry, investigating how it 'benefited both directly and indirectly from the slave trade and imperialism more broadly'.[2]

2 https://www.v-c.admin.cam.ac.uk/projects/legacies-of-enslavement

Commenting on the enquiry, the university's former Vice-Chancellor, Professor Stephen Toope, wrote that 'A society's historical baggage and its modern-day challenges are inextricable'. It is clear that the university's relationship with companies profiting from war crimes and human rights abuses in the Middle East is a perpetuation of the same imperial principle by which Cambridge acquired a proportion of its wealth.

In 2022, the university commendably cut ties with the Russian Federation in the wake of its assault on Ukraine. In a statement sent to all students and staff, the Vice-Chancellor wrote: 'I strongly condemn this unprovoked act of war, and affirm democratic Ukraine's sovereignty, independence, and territorial integrity'.[3] The university committed to 'reviewing gifts and donations for any funding or institutional research links related to the Russian Federation'. Cambridge, the Vice-Chancellor revealed, had 'for the past few years' 'received no research funding from institutions within the Russian Federation, or from individuals currently facing sanctions'. Strikingly, the same approach has not materialised with respect to military aggression that is supported by our own government - and the university's corporate partners - and for which we have a much greater burden of moral responsibility: Saudi war-crimes in Yemen, the Turkish invasion of Rojava, illegal wars in the Middle East led by the UK and the USA.[4]

This is how the university's 'historical baggage' as an agent of imperialism manifests itself: through indifference to the suffering of communities across the Global South, what one anonymous student called 'selective solidarity'.[5] As King's Chapel was lit up with the colours of the Ukrainian flag, the student wondered: 'Why is it [...] that the red, green and black of Afghanistan have never touched its walls?'

The myth of the socially-conscious arms company

In the example of Russia's heinous invasion of Ukraine we can counter another frequent argument for collaborating with arms companies who are governments - such as the UK or the USA - which are not actively involved in an armed conflict. The mythical 'socially conscious arms company'. After Russia invaded Ukraine, many of the companies profiled in this report - including Airbus and Rolls-Royce - ceased trading with Russia. The same hypocrisy applies here, as both companies still arm Saudi Arabia, Turkey and other oppressive regimes around the world. Furthermore, while cutting ties clearly makes a material difference, there can be no undoing the trade which has already occurred. When European governments halted new arms export licences to Turkey in the wake of its 2019 invasion of Rojava, Turkey was still able to continue its airstrikes on civilian populations and, indeed, collaborations that had already been approved - such as the development of the TF-X fighter jet with BAE Systems - continued as planned. There is no predicting whether states to which it is currently deemed 'acceptable' to export arms will use them in a war of aggression, a fact which further undermines the arms companies' claim that their primary function is 'defence'.

3 https://www.cam.ac.uk/ukraine#group-section-Vice-Chancellors-statement-EqOA4g4Lxz

4 https://www.varsity.co.uk/opinion/23462

5 https://thetab.com/uk/cambridge/2022/04/07/opinion-the-university-of-cambridges-selective-solidarity-for-ukraine-must-be-interrogated-160207

Turkey is also an instructive example of how complicit the arms industry is in violations of international law. In 2022, the UK lifted all restrictions on trade with Turkey which were brought in as a result of its 2019 invasion of Rojava.[6] This is despite evidence coming to light in 2021 that Turkish intelligence was collaborating with ISIS members in their continued war with Rojava. Indeed, the UK government permits military trading with almost every nation in the world, including some of the world's most oppressive and violent states. Between 2011-2020, the UK licensed £16.8bn of arms to countries criticised by Freedom House. Of the 53 countries with a poor record on political and human rights on the group's list, the UK sold arms and military equipment to 39.[7] Between 2010 and 2016, the UK approved arms export licences to 22 of the 30 countries on the UK Government's own human rights watch list.[8] The arms companies profiled in this report often use UK government approval as an ethical benchmark: BAE Systems boast that 'Our activities in Saudi Arabia are subject to UK government approval and oversight'.[9] This is said about a state guilty of 'unrelenting repression' according to Human Rights Watch,[10] and which has, according to a 2020 UN report, 'committed a substantial number of violations of international humanitarian law'.[11]

In practice, the 'defence' sector has almost no due diligence policies. A 2017 investigation by Amnesty International surveyed 22 major arms companies and found that

> No company elaborated on human rights due diligence policies and procedures specific to situations of high risk, for example, in business relationships which involve parties to conflicts or governments responding to political upheaval [...] On the basis of these responses, it is clear that these companies are failing to conduct adequate human rights due diligence as defined by the UNGPs.[12]

The findings of the Amnesty report dispel one last myth about the arms industry: that there is a meaningful difference in the ethos of different companies, especially between those like BAE Systems, whose main industry is 'defence'; and those which are more 'diversified' in the aerospace industry, such as Rolls-Royce. In this report, arms companies often cite 'competitive advantage' as a reason for providing research grants to the university. Yet throughout this report there is more collaboration than competition between the companies mentioned - Rolls-Royce will provide the engines for BAE-built jets, Airbus will collaborate with MBDA, Rolls-Royce and BAE Systems work on the same research project, just as they all support the Saudi-coalition's assault on Yemen.

Almost all the companies profiled in this report have been investigated by the UK's Serious Fraud Office (SFO) for securing contracts illegally or for other corruption charges. Many of them have been implicated in war crimes. Yet they all continue to work with each other and

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[6] https://www.middleeasteye.net/news/uk-turkey-defence-exports-restrictions-lifted#:~:text=The%20United%20Kingdom%20has%20completely,Ismail%20Demir%20said%20on%20Friday.
[7] https://www.theguardian.com/world/2021/jun/27/17bn-of-uk-arms-sold-to-rights-abusers
[8] https://www.independent.co.uk/news/uk/home-news/britain-now-second-biggest-arms-dealer-world-a7225351.html
[9] BAE Systems quoted in Amnesty International (2019), *Outsourcing Responsibility*, p.26. Available online at: https://www.amnesty.org/download/Documents/ACT3008932019ENGLISH.PDF
[10] https://www.hrw.org/news/2020/01/14/saudi-arabia-unrelenting-repression
[11] Report of the Group of Eminent International and Regional Experts on Yemen (2020): Situation of human rights in Yemen, including violations and abuses since September 2014, p.17. Available online at: https://www.ohchr.org/Documents/HRBodies/HRCouncil/GEE-Yemen/2020-09-09-report.pdf
[12] *Outsourcing Responsibility*, p.7

UK universities to produce military technology. Meanwhile their customers continue to bombard, surveil and dispossess communities across the world. The lack of accountability and the reliability of corporate support for oppressive regimes is the reason that it is, to quote Arabian activist Ameen Nemer, 'impossible to separate the people who sell the weapons from the ones that use them'.[13]

Laws Regulating the Arms Trade

In its report *Outsourcing Responsibility*, Amnesty International points out that:

> Acts that could amount to aiding and abetting war crimes include knowingly providing practical assistance or encouragement in the commission of these crimes. In many national jurisdictions, complicity in war crimes is a distinct serious criminal offence for which individuals, including business directors and managers, can be held criminally liable. And some jurisdictions allow for the criminal liability of businesses themselves in such cases. Defence companies carrying out activities that contribute to serious violations of international humanitarian law, such as direct attacks on civilians, expose themselves, or their individual directors and managers, to the risk of prosecution for complicity in war crimes.
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> The International Committee of the Red Cross (ICRC) has argued that arms companies "may indeed play a part in exacerbating violations of international humanitarian law" and concluded that "an arms dealer who sells weapons to a client knowing that the weapons are to be used to commit war crimes is complicit in the crimes, regardless of whether he or she shares the client's motivations."

British law makes it an offence to aid or abet breaches of the Geneva Conventions; so does the Rome Statute of the International Criminal Court. Thus, legally speaking, arms companies are constantly engaged in criminality, but are infrequently held accountable. Through its collaboration with the arms industry, Cambridge supports and gives cover to this legally dubious conduct.

The purpose of this report

A broader investigation into the role of arms companies in supporting war crimes and human rights violations is required. As Radhya Almutawakel, the chair of the Yemeni organisation Mwatana for Human Rights, puts it: 'countless Yemeni victims deserve credible investigations into all perpetrators of crimes against them, including those potentially complicit'.[14] This is clearly beyond the scope of this report, but, as we will see, part of holding these arms companies accountable is confronting and dismantling the military-academic complex, which is one base of the global military supply chain.

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[13] https://caat.org.uk/challenges/arms-companies/
[14] https://www.theguardian.com/uk-news/2019/dec/11/bae-systems-accused-of-being-party-to-alleged-war-crimes

Collaborations with talented UK engineers and academics work to sustain both the reputations and operations of companies like BAE Systems. These collaborations are enabled by the frequent movement of executives and researchers between positions within arms companies and positions within the University. This process hastens the consolidation of consultancy bodies and commercial spin-outs, run out of Cambridge, and increases the profitability and 'efficiency' of military technologies.

This dynamic flow of people, knowledge and money constitutes what we have termed the Cambridge military-academic complex. This report illuminates the architecture that upholds this complex, focusing on two areas: militarised research (sections 2-4), and military service-providing University bodies (section 5).

Just as importantly, it also provides a blueprint for how this complex can be dismantled (sections 6-7). We hope that this can become a story of hope and resistance, spotlighting the work that can, and must, be done to unpick the University's entanglement in the perverted logic of militarism, and to draw it towards an approach that works for social good. Hence we conclude with a list of preliminary demands for demilitarisation.

This report covers the collaborations between the University of Cambridge and the arms industry in the years from 2002 to 2020, during which the university's 'partners' have been found complicit in countless human rights abuses. So extensive are the university's ties to the arms industry that this report will not be comprehensive. Our research, sourced from Freedom of Information Act requests (FOIs) and publicly-available data, may only scratch the surface of the university's involvement in global military violence. In many cases, militarised research intersects with other socially and ecologically harmful technologies and corporations which sustain border-regimes, policing, and the global fossil-fuel economy, which is driving climate breakdown.

Clearly there is a vast amount of work to do. But, in the same way that the military-academic complex has come into being partly through the separation of research from its application, remembering these ties and acting in solidarity with those facing militarised oppression is the first step towards dismantling this complex. This report is just the beginning.

2). Dedicated Military Research Centres

Introduction

In this section we will discuss several dedicated research centres. By dedicated military research centres we mean departments within the university which were set up in collaboration with arms companies, or have since been infiltrated by the interests of these companies, and whose academic integrity is therefore compromised by the commercial interests of industrial partners.

Such centres are not established overnight. They are emblematic of the institutionalised involvement of the arms industry in higher education. The relationships we encounter between the University and arms companies often begin with smaller-scale research funding, which can lead to increasing influence within departments and institutions, and, in the case of Rolls-Royce, a company establishing its own research centre within the university. Rolls-Royce set up its University Training Centre, in the Department of Materials Sciences, after working with the university for 15 years in the Whittle Laboratory.[15]

As these insidious connections increase, the 'academic bubble' ensures that those inside such institutions are often protected from the ramifications of their research by layers of technical jargon, dehumanising language and self-deception. An instructive example is the 'Computational Challenges in Image Processing' talk hosted by the Isaac Newton Institute in September 2017, featuring a presentation by Mark Bray of BAE Systems on 'Computational Challenges for Long Range Imaging'. The presentation began with Bray introducing a targeted airstrike as a maths problem: 'I wouldn't by any means claim to be a mathematician. So I want to set you a problem... What I want to do is use imaging to identify a person at 10km away'.[16]

One of the functions of these dedicated military research centres is to obscure the military application of the research which occurs within them. We acknowledge that some of the research conducted in these centres is of social use, but any positive application of this research (such as purported decarbonisation) is negated by the presence of companies bent on making a profit from the systematic destruction of human life.

Whittle Laboratory and the National Centre for Propulsion and Power

A recent co-option of University resources by arms companies is taking place in the Whittle Laboratory with the creation of a National Centre for Propulsion and Power. The new experimental research facility will have the goal of '[changing] radically the technology transfer process in aerospace and turbomachinery science'.[17] The new centre springs from research undertaken at the Whittle Laboratory, which has 'a distinguished record of translating fundamental research into design technologies'.[18]

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[15] https://www.cam.ac.uk/business/Rolls-Royce
[16] https://gateway.newton.ac.uk/presentation/2017-09-05/21764
[17] www.admin.cam.ac.uk/reporter/2018-19/weekly/6551/section5.shtml#heading2-23
[18] Ibid.

The director of the Laboratory, Professor Rob Miller, boasts that ‘strong industrial partnerships’ with Rolls-Royce, Mitsubishi Heavy Industries and Siemens have propelled the Laboratory to become ‘the world’s most academically successful propulsion and power research laboratory, winning nine of the last thirteen Gas Turbine Awards’.
The PhD course corresponding with this partnership leaves little doubt about the militarisation of research that takes place.[19] The partnership between the Whittle Laboratory and the arms industry is nothing new: ‘From the moment the Whittle Laboratory first opened its doors – and its testing rigs – in 1973, it became an invaluable research partner for Rolls-Royce’.[20]

In January 2020 Prince Charles unveiled a plaque to launch the new centre.[21] The capital cost of the Centre is roughly £44 million, with construction beginning in 2021 to be completed by the end of 2022. The proposals for the National Centre for Propulsion and Power caused controversy within the University. In particular, the proposals given to voting bodies were criticised as ‘misleading’ and ‘a shameless greenwash of war and military operations’.[22] Particular suspicion landed on the fact that the ‘industrial partners’ of this project remained unnamed. Since then, the Whittle Laboratory has revealed that 'Initial funding for the project has come from the UK Government’s Aerospace Technology Institute (ATI), Rolls-Royce, Mitsubishi Heavy Industries, Siemens, Dyson and the University’, with Siemens, Rolls Royce and Mitsubishi Heavy Industries providing at least £10 million worth of funding for the project.[23]

Cambridge Graphene Centre

The Cambridge Graphene Centre hosts ten research groups at the University. Their

[19] www.turbocdt.org/course-information/industrial-partners/
[20] https://www.cam.ac.uk/business/Rolls-Royce
[21] Benjamin Hatton, ‘New National Centre for Propulsion and Power approved in Cambridge’, CambridgeshireLive, 18th June 2020, accessed 10/09/2020, www.cambridge-news.co.uk/news/cambridge-news/new-national-centre-propulsion-power-18443080.
[22] www.admin.cam.ac.uk/reporter/2018-19/weekly/6555/section9.shtml
[23] https://whittle.eng.cam.ac.uk/media/uploads/files/Whittle_Future_of_Propulsion_and_Power.pdf

fundamental research into the properties and technology of graphene, carbon, crystals and nanomaterials is conducted with a view to '[establishing] joint industrial-academic activities to promote innovative and adventurous research with an emphasis on applications'.[24]

The Cambridge Graphene Centre therefore pulls together industry and academic resources, notably academic personnel, influencing the direction of research. A clear illustration of this can be found in the Graphene Flexible Electronics and Optoelectronics Programme, active between 2013 and 2018, which was led by the University of Cambridge and received £2.9 million in funding. The programme was a consortium of over 40 collaborating organisations, working to understand and exploit the properties of graphene. There was 'an emphasis on applications' and 'strong alignment with industry needs'.[25] Companies chosen to collaborate included BAE Systems (project partner), Roke Manor (project partner), and Airbus (collaborator), as well as Cambridge Enterprise and Cambridge Graphene Ltd., a Cambridge spin-out company.

The exact outcomes of the programme are obscure as many are protected by confidentiality agreements. More than just serving a military purpose (evidenced by applications listed on the grant application including 'homeland security' and 'defence, especially in secure communications and radars'), this obscurity illustrates how military encroachment makes academic research unaccountable and secretive. Cambridge Enterprise facilitated '10 patent [applications], numerous invention disclosures, [and] several licencing agreements'.[26]

The programme also established several doctoral training centres to 'develop many skilled researchers over the project lifetime, who will stimulate the sustainability of graphene engineering research and future commercialisation opportunities across a variety of sectors'.[27]

A further example of how uncritical, application-driven research has led to the militarisation of the Centre is exemplified by the Molecular Materials for Photonics and Electronics Research Group, founded in 2003 as part of the Department of Engineering. The group focuses on 'developing new materials to enable the next generation of photonic and electronic devices'.[28] It has over 20 researchers and 5 projects, including one called 'Optical Correlators and Comparators' which lists applications of image searching, head tracking and surface tracking. BAE Systems and Leonardo, the 14th largest arms company in the world in 2020, are industrial partners of the group. Taken together, this provides strong evidence of important research being conducted within a framework of military interests.

Analysis of BAE letter

A letter of support from BAE Systems to the Director of the Graphene Centre for the application of the University for a new facilities suite shows the UK's largest arms company elbowing its way into the central functions of a University research department.

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[24] https://www.graphene.cam.ac.uk/

[25] https://gtr.ukri.org/projects?ref=EP%2fK01711X%2f1&pn=9&fetchSize=10&selectedSortableField=firstAuthorName&selectedSortOrder=ASC

[26] Ibid.

[27] Ibid.

[28] http://www-g.eng.cam.ac.uk/CMMPE/

> This is very relevant and timely, and has significant potential applicability to BAE Systems product portfolio, which encompasses a range of technologies, ranging from advanced and functional materials for communications applications such as antennas at microwave/RF frequencies, sensors for the terahertz range, and optical and electro-optical structures using novel transparent conducting materials. Consequently BAE would welcome an opportunity to get involved through direct support, assistance with facilities, such as fabrication and characterisation or through assistance in aligning the research with BAE Systems applications and requirements, subject naturally to prevailing economic circumstances and the business position. The novel, state of the art characterisation and processing facilities being requested in this proposal, such as the device processing, surface analysis and low temperature capabilities for spectroscopy are critical to develop the areas of graphene and other novel 2D materials.
>
> We thus look forward to being able to test devices and materials with the proposed facilities, at the same time benefiting from the world leading expertise of the Cambridge researchers. Due to the significance of the potential outputs, it is our intention to contribute through an Industrial EPSRC Case Award subject to business conditions. In the event of a successful outcome we would hope to work actively with your group to provide materials consultancy and allow access to our laboratories for test and manufacture of the structures when closer to prototyping.[29]

This letter provides a clear, microcosmic view of the material function of Cambridge Graphene: as an important site in the Cambridge military-industrial complex where funding and resources from companies like BAE Systems is rewarded with access to 'the world leading expertise of the Cambridge researchers'. The letter makes clear that the function of the collaboration is an economic one, 'subject naturally to prevailing economic circumstances and the business position'. The moment this research stops becoming profitable (i.e. delivering financial returns for BAE shareholders while delivering 'world leading expertise' to the company in the form of Cambridge researchers and graduates), BAE has no reason to continue its 'direct involvement' with the project.

BAE Systems Profile

BAE Systems is the 6th largest arms-producing company in the world.[30] The company recorded £24,020,000 of arms sales in 2020 alone, second only to Boeing among Cambridge University's military collaborators. 95% of its sales are to military customers.

In a crowded field, BAE have long been infamous as one of the most egregious companies in the arms industry. In 2005, BAE was found to have secretly paid more than £1 million to General Augusto Pinochet, the former Chilean dictator, notorious for the murder and torture of political opponents.[31] In 2010, BAE was investigated by the US Department of Justice (DoJ) for offences relating to overseas corruption. The company was eventually fined $400

[29] https://www.ifm.eng.cam.ac.uk/uploads/Research/CIP/EPSRC_EQUIP/BAE_Systems.pdf
[30] https://www.sipri.org/databases/armsindustry
[31] https://www.theguardian.com/world/2005/sep/15/bae.freedomofinformation

million, one of the largest fines ever given out by the DoJ.[32] A judge in the trial said the company's conduct involved 'deception, duplicity and knowing violations of law ... on an enormous scale'.[33] The company has been investigated by the UK's Serious Fraud Office for illegal activities in at least seven countries.[34]

Yet BAE continues to create and distribute its weaponry worldwide aiding, abetting and enabling global conflict to thrive. Its products include devastating:

- combat aircrafts
- warships
- Tanks and armoured vehicles,
- Artillery and missiles,
- small arms ammunition,
- cyber & intelligence
- and nuclear missile submarines.

On top of the sheer enormity of this company's impact on conflict and warfare worldwide, BAE systems has had direct involvement in Israel's assaults on Gaza in the last few years. BAE's Lancashire plants are essential to producing the F-35 stealth combat aircraft which has been used by Israel. According to CAAT, the UK produces 15 percent of the value of each F-35, 27 of which were used in Israel's 2021's devastating bombing campaign.[35] BAE have successfully applied for at least four export licences to Israel in the last five years,[36] despite a growing body of evidence and condemnations from human rights organisations that Israel is committing the crime against humanity of Apartheid.[37]

BAE Systems also supports Turkey in its assault on the Autonomous Administration of North and East Syria (Rojava). BAE has provided upgrades to the Turkish F16 fleet. F16s were used extensively to support Turkey's invasion and subsequent occupation of Afrin in Rojava in 2018, forcing the displacement of at least 300,000 people. BAE also supplied equipment for the engines of the A400M Atlas military transport aircraft used by Turkey in this period. In 2017, Theresa May approved an £100 million deal for BAE Systems to support the development of Turkey's TF-X fighter jets.[38] BAE's participation in this partnership has continued in spite of the UK government's suspension of arms sales to Turkey after Turkey's invasion and subsequent occupation of Rojavan territories in 2019, during which Turkish forces and their allies were accused by Amnesty International of war crimes.[39] Indeed, BAE is expanding its collaboration with the Turkish state, stating in its 2021 annual report that:

> Multiple contracts for the Turkish Armed Forces worth in excess of €800m (£672m) are progressing. These include contracts for air defence vehicles, assault amphibious

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[32] https://www.justice.gov/opa/pr/bae-systems-plc-pleads-guilty-and-ordered-pay-400-million-criminal-fine
[33] https://www.independent.co.uk/news/business/news/bae-protesters-win-sfo-injunction-1914892.html
[34] https://controlbae.org.uk/background/sfo.php
[35] https://www.lancashiretelegraph.co.uk/news/19340692.bae-systems-lancashire-firm-condemned-supplying-israeli-jets/
[36] https://caat.org.uk/data/exports-uk/licence-list?company=BAE+Systems
[37]
[38] https://caat.org.uk/data/countries/turkey/uk-arms-sales-to-turkey/
[39] https://www.politicshome.com/news/article/uk-suspends-new-arms-sales-to-turkey-for-weapons-that-might-be-used-in-syria
See also: https://www.amnesty.org/en/latest/news/2019/10/syria-damning-evidence-of-war-crimes-and-other-violations-by-turkish-forces-and-their-allies/

> vehicles, and special purpose 8x8 and 6x6 vehicles. In September a contract extension was signed for a further 84 anti-tank vehicles in addition to the 260 already delivered or in production. Work has also started on a programme to modernise 133 armoured combat vehicles for the Turkish Armed Forces.[40]

In spite of increasing evidence that the Turkish government has committed war crimes and deployed chemical weapons in Rojava, BAE's 2021 report suggests that these 'long term contracts and franchise positions make the combat vehicles business well placed for growth in the medium term'.[41]

One of BAE's largest customers is Saudi Arabia. BAE has provided both weapons and personnel to enable Saudi Arabia's devastating and continuous assault on Yemen, selling the country at least £15 billion of weapons during this time.[42] In 2013 and 2014, the UK government granted BAE three arms-export licences that permitted the sale of an unlimited number of bombs to Saudi Arabia without requiring them to disclose how many had been sold.[43] Saudi aircraft have been used to bomb hospitals, schools and weddings in Yemen, while BAE station 6,300 staff in Saudi Arabia to support and maintain the operational capabilities of the Saudi armed forces.[44]

In 2019, a coalition of human rights organisations including the European Center for Constitutional and Human Rights (ECCHR), Amnesty International, and Mwatana for Human filed a complaint with the International Criminal Court (ICC) in The Hague accusing the company of being party to war crimes.[45]. The 350-page document reconstructs the events of 26 coalition air strikes which can be categorised as war crimes.

Since 2002, the University of Cambridge has accepted 89 research grants worth £4,289,031 from BAE Systems.

Isaac Newton Institute

The Isaac Newton Institute for Mathematical Sciences is a national and international visitor research institute based in Cambridge. It hosts research programmes on aspects of mathematics which have applications in science and technology. The programmes provide a space where 'new collaborations are made and ideas and expertise are exchanged and catalysed through lectures, seminars and informal interaction, which the INI building has been designed specifically to encourage'. In particular, the INI 'plays a central role in the propagation and dissemination of cutting edge mathematics in other disciplines, business and industry'.[46] One such business is BAE Systems, described by the INI as 'helping to protect nations,

[40] (https://investors.baesystems.com/~/media/Files/B/Bae-Systems-Investor-Relations-V3/PDFs/results-and-reports/results/2022/bae-ar-complete-2021.pdf p.91)
[41] Ibid., p.104.
[42] https://www.theguardian.com/business/2020/apr/14/bae-systems-sold-15bn-arms-to-saudis-during-yemen-assault
[43] https://www.theguardian.com/world/2019/jun/18/the-saudis-couldnt-do-it-without-us-the-uks-true-role-in-yemens-deadly-war
[44] https://caat.org.uk/data/companies/bae-systems/
[45] https://www.theguardian.com/uk-news/2019/dec/11/bae-systems-accused-of-being-party-to-alleged-war-crimes
[46] https://www.newton.ac.uk/about

prosperity and people around the world',[47] which BAE presumably accomplishes by regularly facilitating the slaughter of innocent civilians.

The Institute's impact initiative, the Newton Gateway to Mathematics (NGM), 'acts as a vehicle for knowledge exchange between the mathematical sciences and potential users of mathematics, including industry, government, business and other academic discipline'.[48] In particular, the Open for Business Initiative of the NGM '[enables] the formation of new relationships on the business-academic interface and to assist in identifying the common challenges that have greatest potential for research, knowledge transfer, public policy and commercial impact'.[49]

Two out of the Institute's five partners are BAE Systems and GCHQ.[50] On the General Advisory board, which 'advise on strategic matters, important themes and the overall development of the Newton Gateway' is Nick Easton, head of Capability at BAE Systems.[51] Ewan Kirk, the chair of INI, is also non-executive director of BAE. Similarly, the Deputy Director of the Institute, Dr Christie Marr, has had research funded by QinetiQ and the US National Security Agency. As discussed above, BAE Systems has been the primary defence contractor to Saudi Arabia in its sustained attacks against Yemen, as well as providing combat aircraft, missiles and armoured vehicles used in Bahrain to suppress democracy demonstrations.

Workshops

The Institute runs scientific research programmes that last from 4 weeks to 6 months. There are typically 2-3 programmes running at any given time, each involving 20-30 participants. A key selection criteria for programmes is being at the 'forefront of current developments'.[52] Programmes organise workshops on the research being conducted. They expose a clear interface where BAE Systems benefits from the work being done, as illustrated by the following examples.

1. Challenges in Dynamic Imaging Data (June 2015)

This three-day workshop was put on by the Turing Gateway to Mathematics (TGM) in partnership with BAE Systems and Microsoft, and the second day had a specific security focus. The workshop covered challenges in processing and analysing time-varying data 'in order to understand and analyse dynamic image content, detect objects, and track and analyse their behaviours so that what is happening in a sequence of images can be better understood'.[53] The days featured timetabled networking opportunities. Presentations included:

- 'Prediction of Intent for Tracking and Human Interaction Recognition in Real-Time', which stated applications to security and surveillance.

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[47] https://gateway.newton.ac.uk/isaac/homeinstitution/id/1915
[48] https://gateway.newton.ac.uk/about.
[49] http://www.newton.ac.uk/outreach/open-for-business.
[50] https://gateway.newton.ac.uk/isaac/homeinstitution/id/1915
[51] https://gateway.newton.ac.uk/governance
[52] http://www.newton.ac.uk/events/programmes
[53] https://gateway.newton.ac.uk/sites/default/files/asset/doc/1611/challenges%20in%20dynamic%20case%20study.pdf

- ‘Video Analytics and Information Extraction’, presented by Andy Wright, Director of Strategic Technology at BAE Systems.

- ‘Surveillance using Hyperspectral, LiDAR and Spectro-Polarimetric Data’, about illuminating and interrogating scenes with applications including “military target discrimination”, “tracking and identifying people” and “Remote surveillance for defense & security, e.g., imaging a compound in western Pakistan’.[54]

Another feature of the workshops was an industry focus: BAE Systems was invited to present on ‘security issues’. The debrief file noted that ‘a benefit to BAE Systems was the exposure to the academic research community, particularly around being able to articulate challenges in the dynamic images area to an audience of relevant experts. This provided them the opportunity to define bespoke BAE Systems maths problems and some direct outcomes of the workshop were the establishment of projects with 2-3 universities’.[55]

Nick Easton reflected that ‘This three day workshop ... brought together experts and stakeholders from a variety of areas, allowing us the opportunity to develop relationships and take forward collaborations of value to the Company’.[56]

2. Understanding Multi-Modal Data for Social and Human Behaviour (November 2018)

This day-long workshop spotlighted the Rough Paths theory programme run by the INI and focused on applications for analysing social and human behaviour from large data sources. The day included workshops and opportunities for end-users (including BAE Systems) to communicate their issues in the area. Presentations included:

- ‘Recognising Arabic Handwriting’ - a course which specifically alienates and demonises Islamic and Arabic culture, by implicitly presenting it in the context of ‘defence’.

- ‘Predicting an Adversary’s Course of Action from Sparse Observations’ - which was presented by Paul King from BAE Systems.

3. Quantum Research - Identifying Future Challenges and Directions (May 2014)

This two-day workshop was part of a collaboration project between GCHQ and the TGM to address challenges in cyber security.

The centre wrote that the workshop’s objective was ‘to identify future challenges and directions for post-quantum cyber-security research and to generate ideas for developing UK research

[54] **https://gateway.newton.ac.uk/sites/default/files/asset/doc/1608/Bob%20Plemmons.pdf**
[55] https://gateway.newton.ac.uk/sites/default/files/asset/doc/1611/challenges%20in%20dynamic%20case%20study.pdf
[56] Ibid.

and teaching in the area. There was the opportunity to discuss the scientific aspects of the upcoming GCHQ funding call'.[57]

The workshop included a presentation by Richard Pinch, GCHQ's Strategic Advisor for Mathematics Research and former number theorist at Cambridge, on 'The Need to Develop the UK Community in Post-Quantum Research', as well as multiple other research presentations, a breakout session, a funding call, and timetabled networking opportunities.[58]

In an opinion article written for the London Mathematical Society Newsletter in January 2014, four months before the workshop, Tom Leinster of the Edinburgh University School of Mathematics pointed out the ethical implications of mathematicians collaborating with GCHQ. He wrote, 'It has been suggested that mathematicians today are in the same position as nuclear physicists in the 1940s. However, the physicists knew they were building a bomb, whereas mathematicians working for GCHQ may have little idea how their work will be used'.[59] He issued this warning in relation to his accusing GCHQ of 'law-breaking on an industrial scale',[60] and mass surveillance of the public as 'a powerful tool for chilling dissent, activism, and even journalism'.

Writing in an opposing opinion piece, Richard Pinch countered Leinster's claims a month before his presentation at Cambridge, claiming that GCHQ 'is subject to some of the most rigorous legislative and oversight arrangements in the world'.[61] This runs counter to the judgement of a Queen's Counsel specialising in public law that GCHQ's mass surveillance is illegal,[62] an EU parliamentary inquiry which said that it '[appeared] illegal',[63] and a GCHQ lawyer saying that 'we have a light oversight regime compared with the US', referring to the NSA.[64] In the US, just 1 in 3000 of the NSA's surveillance requests are rejected.[65]

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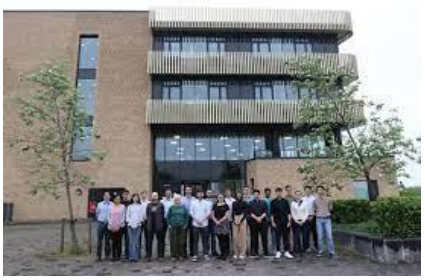
[57] https://gateway.newton.ac.uk/event/tgmw13
[58] https://gateway.newton.ac.uk/event/tgmw13/programme
[59] https://www.maths.ed.ac.uk/~tl/LMS_newsletter_April_2014.pdf
[60] Tom Leinster, 'Should mathematicians cooperate with GCHQ?', *The University of Edinburgh*, 28th February 2014, accessed 10/09/2020, https://www.maths.ed.ac.uk/~tl/lmso.html. Leinster refers to the 2014 inquiry by the European Parliament's Committee on Civil Liberties, Justice and Home Affairs, which condemned GCHQ and the NSA's indiscriminate collection of personal data as reported in Nick Hopkins, 'Huge swath of GCHQ mass surveillance is illegal, says top lawyer', *The Guardian*, 28th Jan 2014, accessed 10/09/2020, https://www.theguardian.com/uk-news/2014/jan/28/gchq-mass-surveillance-spying-law-lawyer.
[61] Tom Leinster, 'Should Mathematicians Cooperate with GCHQ? Part 2', *The n-Category Café*, 30th April 2014, accessed 10/09/2020, https://golem.ph.utexas.edu/category/2014/04/should_mathematicians_cooperat_1.html.
[62] Nick Hopkins, 'Huge swath of GCHQ mass surveillance is illegal, says top lawyer', *The Guardian*, 28th Jan 2014, accessed 10/09/2020, https://www.theguardian.com/uk-news/2014/jan/28/gchq-mass-surveillance-spying-law-lawyer.
[63] Nick Hopkins and Ian Traynor, 'NSA and GCHQ activities appear illegal, says EU parliamentary inquiry', *The Guardian*, 9th Jan 2014, accessed 13/09/2020, https://www.theguardian.com/world/2014/jan/09/nsa-gchq-illegal-european-parliamentary-inquiry.
[64] https://www.theguardian.com/uk/2013/jun/21/legal-loopholes-gchq-spy-world
[65] https://web.archive.org/web/20190305160338/https://epic.org/privacy/surveillance/fisa/stats/default.html

Rolls Royce University Training Centre

The Cambridge Rolls-Royce University Training Centre (UTC) was established in 1994 and is part of a wider 'strategy of developing long-term relationships with universities' to give Rolls-Royce 'access to a wealth of talent and creativity to help protect [their] capability into the future'. The Cambridge UTC focuses on the metallurgy of high-temperature alloys, with other UTCs addressing other key technologies, meaning 'collectively they tackle a wide range of engineering disciplines' relevant to Rolls-Royce.[66] An article published in Materials World in 1994 identified the UTC's key research interests, including nickel-based alloys that are 'used for components such as turbine blades, discs and nozzel guide vanes which must operate in the hottest parts of the engine'.[67] An updated remit of the Rolls-Royce UTC is 'all aspects of the metallurgy of the alloys that are used in aerospace gas-turbine engines'.[68]



The UTC is based in the Department of Materials Science and Metallurgy, providing 'UTC researchers with access to the state-of-the-art electron microscopes and equipment required to conduct their research'.[69] A letter of support from Rolls-Royce to Professor O'Neill of the Department of Engineering for the funding bid for new materials equipment reveals the University as an outpost for the world's 22nd-largest arms company. The letter said Rolls-Royce saw the bid as an opportunity 'to foster collaboration between industry and academia, with shared equipment that will be available for use by both'. It goes on to say that 'we see great potential for this equipment to enhance the quality and novelty of the research carried out by the Partnership in the Materials Science Department'. Rolls-Royce commented that 'there are several projects currently in progress or planned which will benefit greatly from this equipment'.[70]

The Rolls-Royce UTC hosts multiple research programmes that have clear military applications. The Advanced Turbine Technologies project (2013-2017) between the University and Rolls-Royce exemplifies this. The project targeted 'the development and verification of a wide, but holistic set of Turbine technologies for improved component and sub-system competitiveness of future Turbines'.[71] The project cost was £12 million with £6 million funding from Rolls-Royce. A patent was filed by Rolls-Royce following the project.

Whilst it is clear that some of the research being worked on in the UTC is valuable, especially research towards decarbonisation, a 2019 university promotion of Rolls-Royce reveals the sinister implications of Rolls-Royce's involvement in this research. Rolls-Royce provides research funding and equipment in exchange for exclusive access to some of the UK's brightest young engineers - as the university bluntly puts it: 'a steady supply of young engineering talent'.[72] Corporate interests co-opt transformative research undertaken by

[66] https://www.rolls-royce.com/about/our-research/research-and-university.aspx
[67] https://www.rrutc.msm.cam.ac.uk/about-us/History
[68] https://www.rrutc.msm.cam.ac.uk/research-themes
[69] https://www.rrutc.msm.cam.ac.uk/about-us
[70] https://www.ifm.eng.cam.ac.uk/uploads/Research/CIP/EPSRC_EQUIP/Rolls-Royce.pdf
[71] https://gtr.ukri.org/projects?ref=113007
[72] https://www.cam.ac.uk/business/Rolls-Royce

students within the university to improve their profit-margin. Students, of course, have no control over how the university's partners 'apply' this research.

Currently, Rolls-Royce 'provides varying degrees of support for more than 50 Cambridge PhD students at any one time', normalising the involvement of arms companies in higher education, and, in turn, signposting graduates towards pursuing a career in the arms industry. As Professor Rob Miller reflects, 'From Rolls-Royce's perspective being able to recruit some of our most talented engineers is clearly an advantage. But it's also an advantage for us to have generations of Cambridge-trained engineers at Rolls-Royce'.[73] This is what we mean by the 'military-academic complex': a revolving door between the marketised education system and destructive military industries. All the while, the university actively ignores the violence perpetrated by its 'partners' outside of this academic bubble.

Rolls-Royce Profile

Rolls-Royce is the 22nd largest arms-producing company in the world, recording $4.87 billion in arms sales in 2020 alone.[74] The company provides the engines for approximately one quarter of global military aircraft and has its equipment installed on over 2,200 warships, including all of the UK's nuclear submarines.[75] It boasts that its 'defence' technology is supplied to '160 customers in 103 countries'.[76]

Just one of these countries is Saudi Arabia. In a damning 2017 report, Amnesty International revealed the extent of Rolls-Royce's complicity in the Saudi coalition's assault on Yemen: 'BAE Systems, Lockheed Martin, Raytheon, Rolls-Royce and Thales – are integral to the coalition air campaign, supplying and servicing combat aircraft, aircraft engines, guided bombs and delivery systems'.[77] The company provided 'modules, accessories and components and new spare parts for the Royal Saudi Air Forces' Tornado RB199 engines, which have been used in the Yemen conflict'.[78] In 2015-17 alone, Rolls-Royce earned £1.107 billion in revenue from its operations in Saudi Arabia.
In 2022, Rolls-Royce announced that, alongside its local partner, Kale, it would be producing the engine for the planned TF-X, Turkey's first indigenous fighter jet.[79] This contract comes on the back of an international suspension of arms sales to Turkey after its 2019 invasion of Rojavan territory. Despite mounting evidence that Turkey has supported ISIS extremists in northern Syria in their war on Rojava and increasing evidence that Turkish forces themselves have committed war crimes in the region, Rolls-Royce continues their long-running collaboration with one of the world's most oppressive states. As of July 2022, Turkish President Recep Tayyip Erdogan looks poised to continue the invasion of Rojava.[80]

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[73] Ibid.
[74] https://www.sipri.org/databases/armsindustry
[75] https://caat.org.uk/data/exports-uk/licence-list?company=Rolls-Royce
[76] https://www.rolls-royce.com/products-and-services/defence/aerospace.aspx
[77] (Amnesty International, Outsourcing Responsibility: Human Rights Policies in the Defence Sector, p. 13.)
[78] Ibid., p.20.
[79] https://www.defensenews.com/industry/2022/03/14/rolls-royce-kale-to-develop-engine-for-turkish-fighter/
[80] https://www.rudaw.net/english/middleeast/23052022

Corruption and indifference to international law appears to be an endemic part of the culture at Rolls-Royce. While they were arming Saudi Arabia, Turkey, and other oppressive regimes, Rolls Royce were also being investigated by the UK's Serious Fraud Office into allegations of bribery which resulted in the company paying £671 million in penalties in 2017.[81] This was the culmination of years of allegations against the company from across the world,[82] with a BBC investigation the previous year identifying 12 countries in which Rolls-Royce had hired 'commercial agents' or advisers to help it secure high-value contracts.[83]

The company's track record on workers' rights is also appalling. Last year, Rolls-Royce revealed its plan to cut over 8,500 jobs across its workforce.[84] In the same year, its CEO, Warren East, was awarded a bonus of nearly £3 million.[85]

Since 2002, as allegations of corruption and complicity in injustice the world over have continued to emerge, Cambridge University has taken over £36 million from Rolls-Royce, in the form of 1347 research grants.

[81] https://www.theguardian.com/business/2017/jan/16/rolls-royce-to-pay-671m-over-bribery-claims
[82] https://timesofindia.indiatimes.com/india/Rolls-Royce-to-return-to-govt-Rs-18-crore-paid-to-commission-agents/articleshow/31745173.cms
[83] https://www.theguardian.com/business/2016/oct/31/rolls-royce-middlemen-may-have-used-bribes-to-land-major-contracts
[84] https://www.business-live.co.uk/manufacturing/rolls-royce-cut-8500-jobs-22410340
[85] https://www.ft.com/content/d7f520e6-0c0e-4a5c-a833-6abbbd842971

3). Spinouts

Introduction

Spin-outs are companies founded by members of a university to commercialise research findings. Whilst most spin-out companies are not involved in the arms industry, several spin-outs in recent years have used Cambridge research, supported by the University, to produce deadly military hardware. In these examples, we can see how the lack of accountability and regulation afforded by the 'spin-out' structure makes research more accessible to military bodies and other companies which supply oppressive states.

Spin-outs are usually facilitated by Cambridge Enterprise, an arm of the University responsible for 'technology transfer' and the 'commercialisation of new ideas, technologies and scientific inventions'.[86] This often involves assisting members of the University to set up new businesses exploiting their research, providing initial investments from a 'seed-fund' or supporting researchers carrying out consultancy for external corporations. Support for spin-out businesses also occurs over a much longer timeframe, with spin-outs permanently hosted on university premises. In addition, many directors retain senior roles in University research departments, displaying a clear conflict of interest. In recent years, several spinouts supported by Cambridge Enterprise have formed extensive partnerships with major arms companies - thus enabling research, resources and expertise from the University of Cambridge to be exploited for military use. In addition, Cambridge Enterprise has supported spin-outs operating in the oil and gas industry.[87]

The examples included are far from an exhaustive list. Between 2011 and 2021 Cambridge Enterprise has 'invested cash, on behalf of the University of Cambridge, in 100 spin-outs', according to a Freedom of Information (FOI) request seen by Demilitarise Cambridge.[88] Cambridge Enterprise revealed that they are aware that 'one of these spin-out companies had a contract with an arms company or government military body in the period', although the University of Cambridge is no longer invested in this company. Cambridge Enterprise declined to comment on which spin-out this was 'on the grounds that its disclosure would be likely to prejudice the commercial interests of the company'. Once more, the interests of private corporations are prioritised over public accountability.

As well as providing support, the university can profit from spinouts through fees, equity or revenue in exchange for intellectual property licensing for several years after the initial spinout, whilst also gaining significant returns on initial start-up investments. Through facilitating research spin-outs that go on to participate in arms development, the University supports, enables, and profits from the use of its research to produce deadly weapons.

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[86] https://www.enterprise.cam.ac.uk/for-the-university/
[87] https://www.8power.com/applications/
[88] https://www.whatdotheyknow.com/request/spin_outs_involved_in_arms_indus#incoming-2087585

Cambridge Flow Solutions

Cambridge Flow Solutions (CFS) is a Cambridge spin-out company that provides proprietary software and simulation services.[89] The primary service that CFS offers is working with clients to develop customised software to 'augment their capabilities'.[90]

CFS was incorporated in 1999.[91] There does not appear to have been any immediate collaboration between the spin-out and military partners. CFS is an instructive example of a spin-out, however, in that it neatly illustrates the trajectory of marketised research towards militarisation, to the point that less than 25 years after it was incorporated, CFS's majority shareholder became an arms company.

CFS has had several projects in collaboration with arms companies in the last decade, exemplified by the project, 'Geometry Handling and Integration' (GHandI). GHandI was a collaborative research venture led by MDBA, a leading missile developer, in partnership with Airbus, Altran, Aircraft Research Association, BAE Systems, International Technegroup and Rolls-Royce. The project aimed to develop and manipulate geometries to optimise shape performance of aircraft and turbomachinery. It was active between 2013-2015.[92] The project set out to 'enable MBDA, Airbus, BAE Systems and Rolls-Royce to offer better products faster and with increased confidence, leading to a greater market share'.[93]

Project Leader, Robin Addison, MBDA, said: 'Improving aerodynamic modelling techniques is becoming increasingly important. The results from the GHandI project and the advanced geometry handling and meshing technology developed give us the critical building blocks needed to innovate the next generation of aircraft'.[94] Another advantage of the project was, for MBDA, 'Networking to the wider UK research community […] for both input and dissemination'.[95]

Furthermore, MBDA have reported that 'Interactions occurring in the project have also led to the formation of another ATI [Aerospace Technology Institute] project, AUGMENT (CR&D 102364), between ITI and Cambridge Flow Solutions: this is focused on developing the world-leading technologies embedded in CADfix and BoXer further and exploiting the potential mechanisms for interfacing between the use of analogue and digitised representations of airframe and/or turbo-machinery geometry'.[96] CFS was the lead partner of AUGMENT, which had a cost of nearly £1.3 million and ended in 2018.

This is another case of Cambridge research being commercialised and drawn into the military industry. By contributing its research to the consortium, CFS shared its expertise with all the arms companies involved, not least the project partner MBDA, a 'world-class leader in missiles

[89] https://edpc.eng.cam.ac.uk/cam-enterprise, p.20; https://www.enterprise.cam.ac.uk/our-services/industry-government-and-non-profits/opportunities-to-invest/equity-portfolio/
[90] https://web.archive.org/web/20181016174921/http://www.cambridgeflowsolutions.com/en/about-us/what-we-do/
[91] https://find-and-update.company-information.service.gov.uk/company/03720254/filing-history?page=5
[92] https://web.archive.org/web/20210707081039/https://www.ati.org.uk/media/jftptyw1/ati-project-directory.pdf
[93] Ibid.
[94] Ibid.
[95] https://www.mbda-systems.com/press-releases/mbda-uk-leads-key-aerodynamics-project-to-deliver-aerospace-innovation/
[96] Ibid.

and missile systems'[97]. These 'world-class' missiles have been used by the Saudi coalition against Yemeni civilians and by the Gaddafi regime in Libya.[98]

CFS became further embedded in militarised research in the follow-up GEMinIDS project, led by Rolls-Royce and with over £9 million funding. GEMinIDS 'brings together the technology and consortium established in GHandI, with leading SMEs and academics in the field, to produce a project with a scale, breadth and level of synergy that will enable a step change in UK competitiveness in this important enabling technology'.[99]

In 2020, CFS collaborated with Rolls-Royce, BAE Systems, MBDA, ARA, CFMS and the University of Southampton on the COLIBRI (Collaboration Across Business Boundaries) project, which aimed to 'develop new tools that exploit advances in AI/ML to improve and speed up the collaborative design environment for the UK's aerospace design community'.[100] The £8,871,135 funding of this project was provided by the Aerospace Technology Institute (ATI) working through Innovate UK, the UK's innovation agency.[101]

A year later, in December 2021, Mitsubishi Heavy Industries, the world's 26th largest arms manufacturer, quietly became the majority shareholder of CFS.[102] Yasuro Sakamoto, an academic associated with Mitsubishi,[103] became the company's new director in 2022.[104] A brief statement on the company's website suggested that working with Mitsubishi 'will give us the stability to strategically develop our innovative product portfolio based on our BOXER software system with stability and confidence'.[105]

Once again, we can see that once academic research is opened up to the global market - in which arms-companies play a major role - and any basic standards of academic accountability are removed by incorporation as a private company, it is almost inevitable that arms-companies come to literally take ownership of the direction of future research. For arms companies, the spin-out is in many ways the perfect vehicle for collaborating with an institution like the university of Cambridge.

Airbus profile

Airbus is the 11th largest arms company in the world, reporting annual arms sales of $11.99 billion in 2020.[106] The company has a 37.5% stake in MBDA, Europe's dominant missile manufacturer, as well as producing its own military goods, including 46% of the Eurofighter Typhoon combat aircraft programme.[107] According to CAAT, 'The Eurofighter Typhoon has been a core part of the Saudi military's devastating attacks on Yemen over the past

97 https://www.mbda-systems.com/about-us/mission-strategy/
98 https://www.caat.org.uk/resources/companies/mbda-bae-systems-airbus-leonardo
99 https://gtr.ukri.org/projects?ref=113088
100 https://gtr.ukri.org/projects?ref=113296
101 https://www.cambridgeflowsolutions.com/en/news/events/
102 https://find-and-update.company-information.service.gov.uk/company/03720254/filing-history
103 https://typeset.io/authors/yasuro-sakamoto-50qiab33wo
104 https://find-and-update.company-information.service.gov.uk/company/03720254/filing-history
105 https://www.cambridgeflowsolutions.com/en/news/events/
106 https://www.sipri.org/sites/default/files/2021-12/fs_2112_top_100_2020.pdf
107 https://caat.org.uk/data/companies/airbus-group-eads/

six years'.[108] 18,000 civilians have been killed by the Saudi-led coalition's airstrikes in Yemen since 2015.

Airbus also collaborates with Turkey, providing the wings for the A400M Atlas military transport aircraft, seven of which were supplied to Turkey between 2014 and 2017.[109] The Airbus website proudly boasts that 'Airbus and Turkey have a long history of partnership with successful projects in civil and military aviation'.[110] Airbus even established a subsidiary company (Airbus Defence and Space Turkey) in 2013 whose 'primary founding purpose' is 'to fulfill the in-service support responsibilities coming from the main sales contract of A400M'.[111] Airbus aims to increase their collaboration with the Turkish state to $5 billion of sales annually by 2030.[112]

Like many of the other arms companies profiled in this report, Airbus has been implicated in accusations of illegal procurement of its arms contracts. In 2012 the Serious Fraud Office (SFO) opened an investigation into an Airbus subsidiary, GPT Special Project Management, after it was alleged the company bribed Saudi Arabian officials to win a communications contract for the Saudi National Guard. In July 2020, GPT and three individuals were charged with corruption by the SFO.[113]

Since 2002, Cambridge University has accepted 15 research grants worth £315,871 from Airbus.

Silicon Microgravity

Incorporated in 2014 and 'based on over ten years of research from the Nanoscience Centre at the University of Cambridge in collaboration with the energy company BP',[114] Silicon Microgravity is a spin-out based in Waterbeach, just outside Cambridge.[115] The company aims 'to solve complex challenges and create value through the application of gravity and motion detection, responsibly'.[116] Part of Silicon Microgravity's work is developing gyroscope and accelerometer technology which 'will be integrated into a wide range of inertial navigation systems delivering MEMS based tactical and navigation grade sensing',[117] with listed applications including 'defence', 'aerospace', 'autonomous vehicles' and 'robotics'.[118] In 2021, Silicon Microgravity was criticised by Cambridge Tech and Society's

[108] Ibid.
[109] https://www.sipri.org/databases/armstransfers
[110] https://www.airbus.com/en/our-worldwide-presence/airbus-in-europe/airbus-in-turkey
[111] Ibid.
[112] https://www.hurriyetdailynews.com/airbus-to-invest-over-5-bln-in-turkey-by-2030-147156
[113] https://www.sfo.gov.uk/2020/07/30/sfo-charges-gpt-and-three-individuals-following-corruption-investigation/
[114] https://www.silicong.com/images/SMG-press-release-jun-2018.pdf
[115] https://find-and-update.company-information.service.gov.uk/company/09221340/filing-history?page=3
[116] https://www.silicong.com/about.html
[117] https://silicong.com/
[118] Ibid.

‘Stop Killer Robots’ campaign for its recent collaborations with the Ministry of Defence, producing technology relevant to the development of Lethal Autonomous Weapons.[119]

Between 2015 and 2019, Silicon Microgravity granted £567,000 in research funding to the university.[120]

The University of Cambridge and Lethal Autonomous Weapons

In 2021, an investigation by the Stop Killer Robots campaign revealed the university to be deeply complicit in the production of Lethal Autonomous Weapons (LAWs). As the campaign points out, LAWs create an ‘increasing potential for mass atrocities, and a lack of a clear line of accountability for unlawful civilian deaths’ as well as the potential for bias to be coded into technology systems, ‘where people of colour, women and non-binary people are at greater risk of misidentification and unlawful killing’.[121] LAW technology is also deployed to prop up border control, policing and oppressive regimes.

Cambridge’s involvement in LAW development is not only in research ties, but a revolving door into the industries producing this technology. The Computer Science Department’s ‘Supporters’ Club’, for instance, encourages student participation in LAWs development by allowing paying club members to gain access to recruitment channels.[122] Current members include Rebellion Defence - which provides ‘mission focussed’ AI to the UK, US and allied militaries - and former members include Xilinx, which is known to have worked with Turkish drone manufacturer Baykar Makina, a supplier of drones deployed in Armenia, Syria and Libya.[123]

The campaign also highlights broader militarisation of research in the Computer Science department. The Prorok lab, spearheaded by Amanda Prorok, has received major funding from the US army to develop the ability of autonomous agents to cooperate (swarm). Past research outputs have been funded by the likes of Terraswarm and United Technologies (now Raytheon). The Lab lists undergraduates among its current and past research contributors.

Tortech Nanofibres

In 2010, Q-Flo, a Cambridge spin-out, had been working on technology to create novel carbon nanotubes with unique properties. However, early stages of production were not commercially feasible because creating the nanotubes proved very capital-intensive. A consultancy agreement was therefore signed by Cambridge Enterprise to initiate the joint venture Tortech

[119] https://docs.google.com/document/d/1ZZHqeITK3eCYA8kXhSm21qy4pjpBqMBG/edit?fbclid=IwAR3-uP0P2IoXMpJ5_ndWXhRvU4yrqe8d0---PhIHn8JXx7MFiL7XVa8rdNQ
[120] https://www.varsity.co.uk/news/22323
[121] https://docs.google.com/document/d/1ZZHqeITK3eCYA8kXhSm21qy4pjpBqMBG/edit?usp=sharing&ouid=115458442015055678300&rtpof=true&sd=true
[122] https://www.cst.cam.ac.uk/supporters-club
[123] https://www.cst.cam.ac.uk/supporters-club/members

Nanofibres between Israeli company Plasan Sasan Ltd and Q-Flo. The initial goal of Tortech was to overcome the scaling problems and commercialise production. [124]

By forming Tortech, Q-Flo agreed to give Plasan exclusive sales and marketing rights to emerging military products, chiefly body armour and composite motor vehicle bodies. The carbon nanotube technology that underpinned the venture is three times tougher than current body armour materials, according to Tortech. Cambridge Enterprise filed an initial patent application for the technology in 2003, the year before Q-Flo 'spun-out' as a private company.[125] Dan Ziv, CEO of the Plasan Group, summarised the commercial bent of this research: 'This is an exciting venture since we believe Q-Flo's carbon nanotubes have the potential to revolutionize the defense industry through a new range of lightweight, flexible and incredibly strong armored material'.[126]

Q-Flo boast that this is a primary aim of their research: 'Our commitment is to add value by extending our knowledge in both manufacturing and end use applications'.[127] It is clear, in the case of Tortech fibre, that Q-Flo knew exactly what this 'end use application' was. As Dr Dai Hayward, CEO of Q-Flo, commented at the time: 'Through Tortech, we intend to produce a carbon nanotube-based yarn, which can be woven into the strongest-ever manmade material. Plasan's expertise will then enable the design and production of a revolutionary new range of body and vehicle armor'.[128] Armoured vehicles were and are central to the demolition and forced relocation of Israel's minority Arab population, part of wider systemic oppression of Palestinians by the Israeli Defence Forces, for which Plasan is a 'preferred supplier'.[129]

Plasan Profile

Although a relatively small military company, Plasan is illustrative of the ways in which militarised research can be used to target civilian populations. Founded in 1985, Plasan is one of the largest armour companies worldwide - providing both personal armour and armoured vehicle components, such as the MRAP used in US military operations. As an Israeli owned and operated company, Plasan is heavily involved in the violent territorial dispossession of the Palestinian people.

The militarisation of Cambridge research through spinouts such as Tortech and Plasan is one part of a wider pattern of the University's complicity in Israeli apartheid. In addition to working with arms companies such as Plasan, BAE Systems, Boeing and Rolls-Royce, Cambridge has over £120 million of investments in Israeli apartheid. Furthermore, Caterpillar, whose bulldozers are used in the construction and securitisation of illegal Israeli settlements, is a member of the Cambridge Service Alliance.

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[124] https://www.enterprise.cam.ac.uk/case-studies/making-progress-towards-a-materials-revolution/.
[125] Ibid.
[126] https://www.shephardmedia.com/news/landwarfareintl/plasan-and-q-flo-announce-joint-venture/
[127] https://web.archive.org/web/20220802131959/https://q-flo.com/
[128] https://defense-update.com/20101122_tortech_nano_fibers.html.
[129] https://www.theguardian.com/world/2019/jul/22/israeli-crews-demolish-palestinian-homes-in-east-jerusalem; http://www.army-guide.com/eng/firm72.html.

In addition to providing armaments enabling the continuation of Israeli apartheid in Palestine, Plasan products also support the continued militarisation of police and border forces: armoured vehicles produced by Plasan such as the GUARDER are explicitly marketed for use in locations from "inner cities to borders[130]".

Cambridge Aerothermal

Cambridge Aerothermal provides technology for the aerospace industry. They pride themselves on 'attracting the best minds, by working in small autonomous teams and by taking a hands on approach'.[131] Its flagship technology, developed in partnership with Mitsubishi Heavy Industries, is the Sonic Probe, a temperature probe used in gas turbine engine combustion chambers. Of the core team of four, the chief R&D engineer has a PhD from Cambridge, one director is a research associate at Cambridge, while the other is a Cambridge professor. Cambridge Aerothermal is also located on university premises in the Whittle Laboratory, providing 'unique access to an extensive pool of talent, expertise, and intellectual resource'.[132]

Whilst, unusually, Cambridge Aerothermal has produced transformative research (such as the 'Open Ventilator'),[133] its status as a spin-out makes it less accountable regarding the application of its research. What is clear is that the company's ethos is defined by market mechanisms, which in turn steers the direction of the research. The foundational 'problem' that it sets out to solve is the fact that 'The aerothermal sector is going through major market disruption. The speed and agility required to maintain a competitive edge is not being met by the traditional approach to technology development'.[134] In sum, they have partnered with an arms company to ensure their research has a 'competitive edge', proving that it is markets and profitability which is leading their research interests, rather than the drive to provide ethical technology. Partnering with Mitsubishi Heavy Industries sets a dangerous precedent for the spin-out's future.

Mitsubishi Heavy Industries Profile

Mitsubishi Heavy Industries is Japan's leading defence contractor and develops, among other weaponry, attack submarines and missiles.[135] It is the 26th largest arms-producing company in the world, recording $4.42 billion of arms sales in 2020. The company frequently collaborates with many of the other weapons-manufacturers featured in this report and is licensed to manufacture many of their products in Japan, from Lockheed Martin's

[130] https://web.archive.org/web/20220625050707/https://vehicles.plasan.com/car/guarder/
[131] https://cambridge-aerothermal.com
[132] https://cambridge-aerothermal.com/contact/
[133] https://raeng.org.uk/programmes-and-prizes/prizes/the-president-s-special-awards-for-pandemic-service/a-new-ventilator-created-in-cambridge-will-help-treat-patients-in-low-and-middle-income-countries
[134] https://cambridge-aerothermal.com/our-culture/
[135] www.mhi.com/news/story/1603071963.html
www.mhi.com/products/defense/type88_surface-to-ship_missile_ssm_1.html

‘PATRIOT’ surface-to-air missile system to Boeing’s F-15J fighter plane.[136] In 2022, Mitsubishi announced it was collaborating with BAE Systems to produce a ‘next-generation fighter jet’ that the Japanese government aims to deploy in 2035, with Rolls-Royce producing the engine.[137]

[136] https://www.mhi.com/products/defense/mim104_patriot.html; https://www.mhi.com/products/defense/f_15j_jet_fighter.html
[137] https://www.airrecognition.com/index.php/news/defense-aviation-news/2022-news-aviation-aerospace/may/8388-bae-systems-and-mitsubishi-to-cooperate-on-japanese-air-force-f-x-6th-gen-fighter-jet.html

4). Research grants and the militarised university

Introduction

While previous sections have focused on how arms companies have infiltrated Cambridge research departments, this section focuses on how the university is more than a passive participant in this process. As the university's 2019 bid for a Ministry of Defence contract reveals, the university is actively seeking military collaborators for academic research. The university's recent collaborations with Boeing, for instance, reveal an institution which has accepted its function as a for-profit arm of the defence industry. In this section, we give examples of both short and long-term research projects undertaken for arms companies within the university and conclude by analysing the total funding received from military bodies by the university over the last two decades.

MOD bid

A Guardian exposé published in March 2019 detailed leaked documents of a highly controversial bid made by the University to the Ministry of Defence. The University was a final-stage bidder for a contract from the Ministry of Defence's Defence Science and Technology Laboratory (DSTL) for up to £70 million in research funding into the School of Arts and Humanities, looking at how the humanities and social sciences might inform military and security strategies. The other three institutions in the final bidding stage were Lancaster University, QinetiQ and BAE Systems. The contract concerned research into the ways that military activity could be made publicly favourable through 'psychological operations' and 'targeted manipulation of information in the virtual and physical domains to shape attitudes and beliefs in the cognitive domain.[138] In other words, a research facility dedicated to manipulating public opinion towards warfare, in the interest of the government.

One of the six proposed research areas, 'understanding and influencing human behaviour', was described in a presentation by the Ministry of Defence as a 'co-ordinated use of the full spectrum of national capabilities to achieve geopolitical and strategic aims, including military, non-military, overt and covert means, within the rule of law'.[139] If the University had won the bid it would have set up a new research facility, called the Centre for Strategic Futures, with a long-term possibility of becoming a 'profit generating programme management consultancy'.[140] Effectively, the University would have become a for-profit arm of the defence industry.

What this would also mean is that academics involved in the programme would be required to respond rapidly to military requirements, their role would become operational, rather than research based, and they would have far less autonomy over their actions. Over 40 academics voiced their discontent over their potential changes in an open letter to the Vice Chancellor

[138] https://www.theguardian.com/uk-news/2019/mar/13/uk-military-mod-universities-research-psychological-warfare-documents?fbclid=IwAR0dgdOCy7LJ6Mm3oY2jYDRC2cgNLC_Wzjszw_Uo9bnApyPvLqCXnjPabcA
[139] https://www.varsity.co.uk/news/17072
[140] https://www.varsity.co.uk/news/17294

which stated, ‘We do not believe that the role of a public university is to involve staff in armed conflicts by acting as a supplier of contract research to the MoD’.[141]

In an open meeting, the Vice Chancellor Stephen Toope stated that the Ministry of Defence dropped the University as a bidder, though the dates and reasons are unknown, despite an FOI request being issued by the authors of this report.

Leaked documents revealed that three Cambridge University members organised the University to enter the bidding with Frazer-Nash Consultancy, a firm that assists arms companies with the design and manufacture of various weapon systems. Frazer-Nash would ‘provide the primary interface with industry and cover work that requires high levels of security clearance’.[142]

Campaign Against the Arms Trade commented on the bid, saying, ‘Universities are for education, they should never be treated as outposts for the MoD or research departments for the arms industry’.[143] Demilitarise Cambridge made the following statement:

> Cambridge’s bid to lead research into techniques of psychological warfare and behaviour control for the Ministry of Defence is both disgraceful and alarming. Academic research should be open, transparent and oriented towards the social good, not tied up with secretive military programmes to manipulate populations. Alongside close links with arms companies, this episode exposes Cambridge’s academic and commercial stake in the military-industrial complex. Such a role hardly befits the institution’s self-styled position as a ‘social leader’.

MOD profile

The Ministry of Defence (MoD) is the part of the UK government responsible for directing and coordinating the activities of the British Armed Forces whilst setting long term national military policy [144]. As such, this Ministry controls the eighth most powerful military worldwide[145].

Despite the British Armed Forces’ long history of violently enforcing colonial rule[146], the MoD present their activities as ensuring merely national security whilst also carrying out humanitarian missions to prevent human rights abuses. However, forces under the jurisdiction of the MoD have in several cases themselves been responsible for such abuses: despite an attempted cover up by the MoD[147], the International Criminal Court found evidence of war crimes committed by

[141] https://www.varsity.co.uk/news/17294
[142] https://www.varsity.co.uk/news/17072
[143] Ibid.
[144] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920219/20200922-How_Defence_Works_V6.0_Sep_2020.pdf
[145] https://www.globalfirepower.com/country-military-strength-detail.php?country_id=united-kingdom
[146] https://academic.oup.com/hwj/article/doi/10.1093/hwj/dbx053/4785934
[147] https://www.bbc.co.uk/news/uk-50419297

British troops in Iraq[148]. In 2022, a BBC investigation revealed that just one SAS unit 'unlawfully killed 54 people in one six-month tour' and that 'the former head of special forces failed to pass on evidence to a murder inquiry'.[149]Less recently, British troops shot 26 unarmed civilians at a civil rights march within UK borders in the infamous events of Bloody Sunday[150]. In addition to specific abuses, UK forces have been critical partners in disastrous military interventions in Iraq, Afghanistan and Libya within the past two decades.

Although formally accountable to Parliament[151], the MoD has many secretive operations: for example the MoD refused to fully answer questions in parliament[152] about a major partnership providing communications support to the Saudi Arabian National Guard[153], which has been involved in the war in Yemen.

The MoD is not the only governmental military body from which the University of Cambridge accepts research funding. The US army for instance has provided 53 research grants worth £9,078,695 since 2002, while in this same period being found to have massacred civilians, tortured detainees and committed war crimes during disastrous wars in Afghanistan and Iraq. Between 2016 and 2020 alone, US-led airstrikes were revealed to caused 3,977 casualties in Afghanistan, of which 1,598 were children.[154] In 2016 - in response to a Freedom of Information Act request - the US Defense Department released nearly 200 photographs related to prisoner abuse at US military facilities in Iraq and Afghanistan, just one small part of a larger set of 2,000.[155] The university has maintained its partnerships with both the MoD and US army despite evidence of the violence committed by both governments across the world continuing to increase year-on-year.

To conclude: the MoD and the US Army directly control both the day to day running and long term strategy of two of the largest militaries in the world that have been major players in devastating wars and human rights abuses in recent decades. It is important to recognise that military atrocities are not limited to the action of distant rogue states, but have frequently involved forces directed by our own Government through the MoD. This complicity in violence, compounded by insufficient democratic oversight makes the presence of the MoD in universities extremely concerning.

Since 2002, the University of Cambridge has accepted 23 research grants worth £1,625,000 from the MoD alone.

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148 https://www.bbc.co.uk/news/uk-55247033
149 https://www.bbc.co.uk/news/uk-62083196
150 https://en.wikipedia.org/wiki/Bloody_Sunday_(1972)
151 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920219/20200922-How_Defence_Works_V6.0_Sep_2020.pdf
152 https://questions-statements.parliament.uk/written-questions/detail/2019-03-04/228072
153 https://www.dailymaverick.co.za/article/2019-09-27-britains-secret-saudi-military-support-programme/
154 https://reliefweb.int/report/afghanistan/40-all-civilian-casualties-airstrikes-afghanistan-almost-1600-last-five-years
155 https://www.globaltimes.cn/page/202109/1235240.shtml

International Technology Alliance

The 2019 bid was far from the university's first involvement with the MoD, which has established itself as a longstanding research partner of the university. The International Technology Alliance (ITA) was a research collaboration between the US Army Research Laboratory and UK Defence Science and Technology Laboratory (the research arm of the Ministry of Defence active between 2006 and 2016). It drew together several of the world's largest arms companies, including Boeing, Honeywell and Roke Manor, with US and UK universities including the University of Cambridge. Its strategic goal was to 'enhance US and UK capabilities to conduct coalition warfare'.[156]

The initial focus of the ITA was focused on four areas:

1. Network theory around wireless and sensor networks
2. Security across systems (in particular solving security issues that arise when two different networks need to inter-operate)
3. Sensor information processing and delivery focusing on issues involving sensor network information management
4. Decision making and coalition planning for personnel using the network to make informed decisions

According to its own website, 'The NIS ITA represented a new way of doing business: forming an international alliance of government, industry and academia to jointly conduct fundamental research'.[157]

Figure 4: Over the active period of the project the University of Cambridge was responsible for 5 journals, 43 internal conferences, 29 internal conferences, 6 technical reports and 1 patent. The University contributed to 82 papers in total.[158] Over twenty Cambridge academics were drawn into publishing ITA research, majorly from the Department of Computer Science and Technology.

[156] https://web.archive.org/web/20191120182528/https://www.wais.ecs.soton.ac.uk/research/projects/889
[157] https://web.archive.org/web/20180604031314/http://nis-ita.org/
[158] https://web.archive.org/web/20191120182749/http://nis-ita.org/science-library/organisation/Cambridge

Between 2010-2016 the University received 11 research grants from IBM, the leading organisation of the ITA, amounting to over £1 million. Annual financial statements show no grants from IBM following 2016, the year the ITA ended.[159]

Roke Manor Profile

Roke Manor is part of the UK-based Chemring Group, the world's 80th largest arms-producing company in 2013. Between 2008 and 2021 the Chemring Group has been granted at least 19 licenses by the UK government for the export of military goods to Israel and at least 38 to Turkey.[160] Chemring continue to produce military technologies, supplying 'a wide range of components supporting a number of critical missile, bomb and torpedo programs across the US and foreign military customer base'.[161]

Chemring's technologies have been supplied by oppressive regimes across the world in the last decade, having produced the tear gas used by Egyptian security forces against demonstrators in 2011 and Hong Kong police against protestors in 2014.[162] In the same year, Chemring, via Roke Manor, funded a £65,000 research project at Cambridge University.[163]

Recent arms funding and grants

The university, as we've seen, has no real criteria for accepting research funding. Indeed, collaborations in recent years indicate just how detached research carried out in the university is from its applications in 'industry'. Recent funding from Boeing accepted by the Institute for Manufacturing for its Distributed Information & Automation Laboratory (DIAL) program is a good example.

DIAL's collaborations with Boeing have the sole aim of making Boeing's business operations more efficient. The ALADDIN (Achieving Leveraged Advantage from Distributed Information) project, for instance, ran from 2013-2016 and aimed to explore 'how the vast amounts of data Boeing deals with on a daily basis can be turned into a more valuable commodity for the business'.[164] 'For Boeing', the university itself admits, 'funding research is all about achieving competitive advantage'.[165]

The university functions, once again, as a for-profit arm of the defence industry, using students and academics to facilitate their destructive business model. What this business does matters little for the purpose of the ALADDIN project and others like it, the research simply transitions 'into the applicable production environment'. Rather than scientific discovery or social improvement, the aim of the research is to keep its sponsor satisfied: 'Boeing Defence UK [...] are supporting the project and anticipating usable results'.[166] The

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[159] As shown in the Cambridge University Reporter *Financial Management Information* Records 2010-2019. https://www.reporter.admin.cam.ac.uk/online-reporter-archive
[160] https://www.palestinecampaign.org/psc-company/chemring-group-plc/ - CAAT data is not complete
[161] https://www.chemring.com/what-we-do/countermeasures-and-energetics/missile-components
[162] https://www.caat.org.uk/resources/companies/chemring
[163] https://www.admin.cam.ac.uk/reporter/2015-16/special/06/06-FMI-2015-SectionL.pdf
[164] https://www.cam.ac.uk/research/features/dial-b-for-boeing
[165] Ibid.
[166] Ibid.

'use' of Boeing's products is frequently determined by states complicit in human rights abuses.

The university's unquestioning compliance with Boeing's corporate ambitions in projects like ALADDIN was rewarded by Boeing at its annual Supplier of the Year Awards in 2017. The company said its award-winning suppliers had helped it achieve a 'record year' in its commercial aeroplane deliveries, growth in its services business and solid defence, space and security performance.[167]

Boeing profile

Boeing is the 2nd largest arms-producing company in the world, recording $58.18 billion of sales in 2020, of which $32.13 billion came from arms sales.[168] Since 2015, Boeing has supplied the Saudi-led coalition with combat aircraft and munitions to sustain their assault on Yemen. In May 2020 Boeing was awarded US government contracts worth more than $2.6bn for the delivery of air-to-surface and anti-ship missiles to Saudi Arabia,[169] securing a contract to modernise the Saudi F-15 fleet worth up to $9.8 billion just five months later.[170] As more and more evidence of Saudi war crimes emerges, Boeing continues to double down on propping up mass-civilian death and oppression.

Mwatana For Human Rights' 2021 report 'Day of Judgement' details Boeing's complicity in the Saudi regime's war crimes in horrific detail. In 2015, for instance, remnants of a Boeing bomb were found in the remains of civilian homes in a residential neighbourhood in the Al-Dhihar District. Five people were killed by the airstrike, including one child. As Mwatana notes, the attack appears to have been 'indiscriminate': 'Indiscriminate attacks carried out intentionally or recklessly are war crimes'.[171] This was just one incident: in 2015-16 alone, the US delivered 3,600 of the same JDAM (Joint Direct Attack Munitions) Guided Bombs to the UAE.[172]

Without Boeing's collaboration, as Jonathan Caverley, associate professor at the U.S. Naval War College and a research scientist at M.I.T., notes, the Saudi military operation would cease to function:

> The Saudi military has a very sophisticated, high-tech, capital-intensive military that requires almost constant customer service [...] And so most of the planes would be grounded if Lockheed Martin or Boeing turn off the help line.[173]

In 2016 NGOs including the European Centre for Democracy and Human Rights brought a complaint against Boeing to the US National Contact Point, a mediation body, accusing

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[167] http://www.eng.cam.ac.uk/news/university-cambridge-wins-boeing-innovation-award
[168] https://www.statista.com/statistics/267160/sales-of-the-worlds-largest-arms-producing-and-military-services-companies/
[169] https://www.middleeasteye.net/news/us-weapons-giant-boeing-awarded-two-billion-contracts-deliver-missiles-saudi-arabia
[170] https://www.flightglobal.com/defence/boeing-secures-98-billion-contract-for-saudi-f-15-work/141073.article
[171] Mwatana For Human Rights, Day Of Judgement (March 2019), p.50. Available online at: https://mwatana.org/wp-content/uploads/2019/03/Final-Design_Day-of-Judgment_Mwatana.pdf <accessed 01/07/22>
[172] William Hartung, Center for International Policy, US Arms Transfers to the UAE and the War in Yemen 18 (Sept. 2017)
[173] https://inthesetimes.com/features/us-saudi-arabia-yemen-war-arms-sales.html

Boeing of breaching OECD human rights guidelines by failing to carry out due diligence or prevent its products being used in the commission of human rights violations. In 2019 Amnesty International condemned Boeing and other arms companies for 'seemingly ignoring a litany of probable war crimes committed by coalition forces' in Yemen.

Arms manufactured by Boeing have also been used by the Israeli military to terrorise Gaza's civilian population. According to Human Rights Watch, Boeing bombs and bomb guidance kits were used in attacks in May 2021, including an air strike on a three-story building comprised of shops and homes in the al-Shati refugee camp, one of the most densely populated areas on earth, killing two women and eight children. In 2021, shortly after Israel had completed its last assault on Gaza, which killed 248 Palestinian civilians, including 66 children, Boeing sold Israel $735 million of JDAM and Small Diameter Bombs.[174] There can be no denying that Boeing knows exactly how - and on who - their products will be deployed.

In the last 20 years, the University of Cambridge has accepted 56 research grants worth £9,801,346 from Boeing. These stories of suffering and the countless others detailed in the Mwatana report should be required-reading for anyone seeking to justify further 'research' collaborations with Boeing or any of the other arms-manufacturers detailed in this report.

Research funding through the years and totals

Our research has found that between 2002 and 2020 the university received a minimum of **2568** research grants totalling **£109,513,596** from arms-manufacturers and military bodies. Of this figure **£81,197,656** came from arms-manufacturers and **£28,000,069** came from government military agencies and bodies.

This funding has **more than doubled** in the last 20 years, with the university receiving £3.7 million in 2002-2003 and £8.2 million in 2019-20, the latest year that data is available.

Rolls-Royce provided nearly a third of this, giving the university **1347** research grants worth **£36,300,605** over this 19 year period. Mitsubishi Heavy Industries were the second largest funder, giving the university 199 grants worth £13,13,096.

Of the government military sponsors of the university, the U.S. Army contributed the lion's share, giving the university **53** grants worth **£9,078,695** between 2002 and 2020.

	Company	**Grants**	**Funding 2002-2020 (£)**
1	Rolls-Royce	1347	36,300.605
2	Mitsubishi Heavy Industries	199	13,13,096
3	Boeing	56	9,801,346

[174] https://www.timesofisrael.com/biden-moves-forward-with-missile-deal-to-israel-despite-progressive-opposition/

4	Atomic Weapons Establishment	262	7,672,811
5	QinetiQ	166	4,379,903

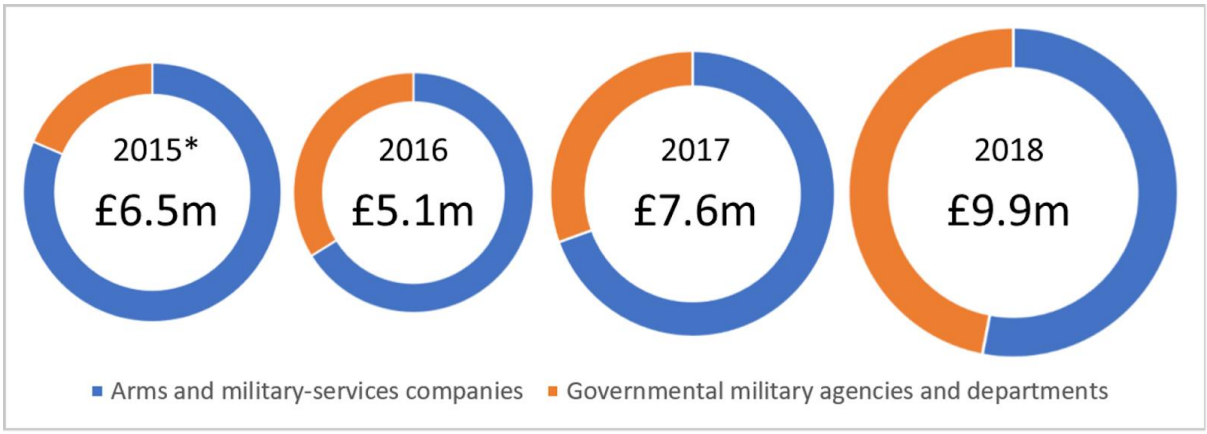

Figure 2: Charts showing the total amount of research funding accepted by the University per year. Orange segments represent grants from government military agencies and departments; blue segments represent grants from arms and military-services companies. *Each year accounts for the year period up until July 31st of that year. E.g. 2015 accounts for the period between July 31st 2014-July 31st 2015. The estimates were created from data in the 'Research grants and contracts' sections of the annual Financial Management Information reports published in the University Reporter.

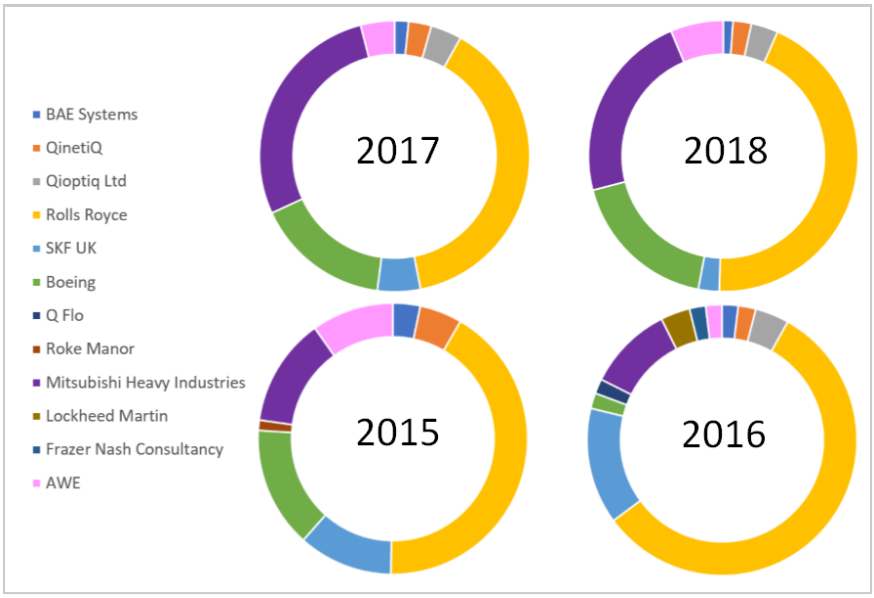

Figure 3: Charts showing the relative research funding accepted from arms and military-service companies by the University of Cambridge between 2015-2018. *Each year accounts for the year period up until July 31st of that year. E.g. 2015 accounts for the period between July 31st 2014-July 31st 2015. The estimates were created from data in the 'Research grants and contracts' sections of the annual Financial Management Information reports published in the University Reporter.

To be clear, these figures are just the sharp end of a very thick wedge. They do not include, for instance, many of the spinouts discussed in the last section, like Silicon Microgravity, who collaborate extensively with the arms industry. Were all such indirect ties included, this figure would be much higher. It also neglects the ties which the University of Cambridge maintains with the arms industry which do not involve research ties. These are the mechanisms by which arms companies maintain such close links with the university, such as consultancy services. This will be the focus of the next section of this report.

5). Consultancy Services

Introduction

Nowhere do the arms and military industries become more violently engrafted onto the fabric of the University than in its servitising and consultancy bodies, which provide companies with practical services, profoundly linking the academy to industry. From having benefactors that pioneered military designs to the extensive list of arms companies they proudly advertise working with, military companies pervade these institutions to such an extent that they appear structural to them.

Beyond providing credibility and brand recognition for arms companies, this section will show how the University of Cambridge enters the military industry and opens up its structures for arms companies to become entangled in an increasingly obscure military-academic complex. The servitising and consultancy bodies enter the business structures of arms companies, and offer practical services to render them more effective and efficient, whilst the companies reciprocally pervert the functions of the University bodies. Paying attention to the dates when these University bodies were established makes one thing clear: University institutions helping the business functions of arms companies are a *new* development of the marketisation of higher education.

Cambridge Service Alliance

Background

The Cambridge Service Alliance (CSA) is a 'unique global alliance between leading businesses and universities' founded in 2010 by BAE Systems, IBM and the University of Cambridge's Institute for Manufacturing and Judge Business School.[175] According to its own promotional materials, the CSA offers partners:

> (1) 'access to leading service research and best practice that helps partners advance their own business models internally and externally'
>
> (2) the 'ability to influence and commission new relevant research'
>
> (3) access to education derived from the Alliance
>
> (4) knowledge-sharing with an exclusive club and associated networking opportunities
>
> (5) brand association opportunities

[175] https://web.archive.org/web/20191120184346/https://cambridgeservicealliance.eng.cam.ac.uk/About/WhatWeDo

> (6) practical tools and techniques that will allow partner organisations to commercially exploit the intellectual property developed through the Alliance.[176]

In summary, the purpose of the CSA is to commercialise and servitise the research produced at the University of Cambridge, as well as, most disturbingly, the ability to influence the direction of future research in the university. The increasing collaborations between arms companies and the university are testament to the importance of emerging consultancy bodies in facilitating militarised research.

The CSA is therefore central to the University of Cambridge's integration with the arms industry. BAE Systems - the sixth largest arms and military service company in the world - was one of the two original industrial members.[177][178] In addition, the Founding Director of the CSA was Professor Andy Neely, the Pro-Vice-Chancellor for Enterprise and Business Relations. Neely worked for BAE Systems' predecessor, British Aerospace.

Les Gregory, Director of Product and Training Services for BAE Systems Maritime,[179] commented in 2013:

> BAE Systems openly seeks the innovation which can only be found in a properly managed, multi-community research programme, focused on exploring the boundaries of performance. The Cambridge Service Alliance provides that environment and BAE Systems is already benefiting from testing new ideas and creating best practice.[180]

Case Study 1: Through-Life Accountability

In 2010, BAE launched 'a holistic review of its approach to product safety' and "approached Cambridge University' via the CSA to gain 'a better understanding of what the Shift to Services meant for product safety'.[181] This began with a workshop with eight different organisations and a paper co-authored by the CSA and BAE Systems. The paper concluded that 'based upon this research the next steps for the Company will be to not only seek to better understand the differences in its organisational culture but also to look closer at accountability and therefore how it might better optimise its businesses for improved service delivery performance'. This led to further research 'conducted in partnership with BAE Systems'.[182] Once again, the 'service' being delivered by BAE Systems does not seem to have been considered.

Case Study 2: Ecosystem Value Mapping

In 2015, "an international BAE Systems project was facing the problem of understanding the value exchange" between multiple companies that had been "awarded development work in the defence sector." By "using the Value Canvas of the Cambridge Service Alliance, the project reviewed the complete value exchange between the multiple companies involved," resulting "not only in a deeper understanding of the ecosystem, but in direct understanding of how value gets created and captured within the ecosystem and how BAE Systems fits within

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[176] Ibid.
[177] https://www.sipri.org/sites/default/files/2018-12/fs_arms_industry_2017_0.pdf
[178] https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/AllianceAnnualReport2012.pdf
[179] https://www.linkedin.com/in/les-gregory-79436516/?originalSubdomain=uk
[180] P.4 https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/AllianceAnnualReport2013FinalSFS.pdf
[181] https://cambridgeservicealliance.eng.cam.ac.uk/system/files/documents/February%202014%20Monthly%20Paper.pdf
[182] https://web.archive.org/web/20161120145100/https://cambridgeservicealliance.eng.cam.ac.uk/About/directory/CharaMakri

this."[183] Building on this, "by early 2016, BAE Systems decided to take this research into its organisation, by initially running additional ecosystem value mapping workshops, and then planning an international capability role-out."[184]

It is clear that there is a symbiotic relationship between the CSA and BAE, with BAE shaping research completed at the CSA and, in turn, the CSA's research shaping business practices at BAE. As reported in the CSA's annual reports, ecosystem value mapping was "developed by the Cambridge Service Alliance within BAE Systems".[185] Dr Florian Urmetzer, who led the CSA's research on ecosystems value mapping and analysis, described how "BAE Systems has decided to invest in the method and has integrated the work done into its sales cycle.[186] BAE Systems' service offerings will now be constructed using ecosystem mapping investigated by the Cambridge Service Alliance."[187]

The Cambridge Service Week

Cambridge Service Week (CSW) was an annual programme of events hosted by the CSA which brings together leading academics, industrialists and policy-makers to address the challenges facing service education, research, practice and policy. As recently as 2017, CSW regularly featured representatives from arms companies:

a. 2012: Andy Neely (Cambridge Service Alliance), Craig Olmstead (Caterpillar Inc) and Sarah Bailey (BAE Systems)
b. 2015: Tom Palmer (Director of Services, Rolls-Royce plc)[188]
c. 2017 Sean Perry-Evans (UK Services Development Director, Thales)

Conference Presentations

Alliance researchers presented at the following conferences:[189]

- 'Business Model Innovation for Support Services', Defence Forum for Market Analysts, Naples, Italy, November 2012.
- 'Manufacturing Business Model Innovation: The Shift to Services', BAE Systems, Service Excellence Community of Practice, September 2012.
- Veronica Martinez spoke at the BAE Systems – Submarine Service Group about 'Service culture: managing the shift to services'.[190]
- Florian Urmetzer was invited by BAE Systems to present at 2019's ITEC Conference. ITEC is the international forum for the military simulation, training and education community.
- Talk: 'Service culture: managing the shift to services BAE Systems, Submarines, Barrow, UK'.
- Quarterly Community of Interest meetings in 2015 included presentations and discussions on: 'Understanding the BAE approach to Condition Based Maintenance',

[183] https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/2015AnnualReportFull.pdf, p. 13
[184] https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/2016AnnualReportCompleteSFS.pdf
[185] Ibid.
[186] Ibid.
[187] Ibid.
[188] https://web.archive.org/web/20191120185058/https://cambridgeservicealliance.eng.cam.ac.uk/ServiceWeek/ServiceWeek2015b
[189] https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/AllianceAnnualReport2012.pdf
[190] https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/2015AnnualReportFull.pdf

‘Understanding the prices and challenges on pricing for MBDA (BAE Systems) Stockpile Management’, ‘The BAE Systems: Hawk Support contract’.[191]

These conferences illuminate the friendly relationship developed by the CSA between the arms industry and academic circles, as well as the way in which academic language serves to disguise the profit motive which underlies this relationship.

Institute for Manufacturing

Background

The Institute for Manufacturing (IfM) is a division of the University of Cambridge's Department of Engineering. Its establishment in 1998 was largely driven by an ex-de Havilland employee, who had become an academic at Cambridge[192]. However, its resources and output dramatically increased to become the IfM we see today when a donation from Allen Reece in 2009 led to the IfM moving sites to the Allen Reece Building[193]. Allen Reece was the owner and director of an arms-producing company[194]. The research aims of the IfM are to help ‘companies develop life-changing products and services, build better businesses, create meaningful jobs, and improve the environment for the future’ and ‘governments foster innovation and enterprise to deliver social and economic benefits’.[195]

Roadmapping Consultancy

The IfM Education and Consultancy Services (IfM ECS) is described as the IfM’s ‘dissemination arm’ and ‘provides consultancy and executive and professional development – based on the new ideas and approaches developed at the IfM – to help policymakers and manufacturing and technology companies around the world create and capture value more effectively’.[196] The profits are gifted to the University of Cambridge to fund future research.

The IfM ECS offers roadmapping training, which is ‘a powerful strategic planning technique that is integral to creating and delivering strategy and innovation in many organisations’.[197] In essence, roadmapping is a tool used to construct the best pathways for technology development for companies. Among the companies the IfM ECS has worked with are Airbus, GKN, IHI, BAE Systems, Caterpillar and Rolls-Royce. The following case studies show how the IfM ECS directly engages with the military goals of arms companies.

1. **BAE Systems (January 2019)**

Freedom of Information requests issued to the IfM ECS revealed emails detailing the ‘collaboration between IfM ECS and BAE Systems, to provide a two-day interactive training

[191] Ibid.
[192] https://www.themanufacturer.com/articles/new-ifm-building-will-link-manufacturing-to-societal-needs/
[193] Ibid.
[194] https://www.telegraph.co.uk/news/obituaries/finance-obituaries/9822180/Alan-Reece.html
[195] https://www.ifm.eng.cam.ac.uk/aboutifm/
[196] https://www.ifm.eng.cam.ac.uk/ifmecs/about/
[197] https://www.ifm.eng.cam.ac.uk/ifmecs/business-tools/roadmapping/roadmapping-at-ifm/

course on strategic roadmapping'. According to the email correspondence, the course was held at the BAE's Samlesbury site for up to 25 BAE Systems personnel and included presentations, activities and discussion. Its primary goal was to provide BAE with 'practical methods that can be used to implement roadmapping'. The IfM ECS training personnel prepared the training days on specific BAE company contexts to 'ensure key company touch points are understood and incorporated 'into the training'.

2. UK Marine Industries Technology Roadmap (2015)

The IfM ECS delivered a roadmap project for the UK's marine industries to '[identify] key opportunities in which industry and government should invest to support export growth and it maps the main technical capabilities needed to capitalise on these opportunities'.[198] Contributing organisations to the roadmap included:

- BAE Systems, the world's fourth largest arms company.
- BMT Defence, which offers 'technical support for submarines, warships and auxiliary vessels'.[199]
- Frazer-Nash Consultancy, which assists arms companies with designing and manufacturing various weapon systems.
- Missionkraft, which offers ''turnkey' packages with ultra-lightweight, fully stabilised remote surveillance/weapons, missile systems'.[200]
- QinetiQ, a leading UK defence contractor.
- Roke-Manor, which produced tear gas used by Egyptian security forces against demonstrators in 2011 and Hong Kong police against protestors in 2014.
- Rolls-Royce, the world's 22nd largest arms company.
- Thales UK, the world's 14th largest arms company.

The final roadmap included military sections and extended its analysis to 'management of complex warships and submarines'.[201] Given that the purpose of the roadmap was to 'identify future priorities, gaps, opportunities and capability needs in order to underpin the UK's marine growth strategy', and military vessels were in the remit of the report, it is safe to say that the report set out in part to identify 'priorities, gaps, opportunities and capability needs' of arms companies and the military.[202]

3. The Defence and Security Technology Competency Report (2014)

The Ministry of Defence commissioned this study by the IfM ECS to address 'technical competencies that cut across defence and security and other sectors'.[203] BAE and Thales contributed to the study, which drew on roadmapping techniques. One recommendation emerging from the report was '[working] with the four military commands to investigate further

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[198] https://www.ifm.eng.cam.ac.uk/news/technology-roadmap-for-the-uk-marine-industries/
[199] https://www.bmt.org/about-us/
[200] https://missionkraft.com/
[201] https://www.ifm.eng.cam.ac.uk/uploads/Resources/Reports/UK-Marine-Industries-Technology-Roadmap-2015.pdf
[202] Ibid.
[203] https://www.ifm.eng.cam.ac.uk/insights/national-innovation-policies/the-defence-and-security-technology-competency-report/

specific technology areas by means of deep dives, where collaboration with funding bodies can leverage wider resources'.[204]

Judge Business School

Background

Cambridge Judge Business School was established in 1990 as the Judge Institute of Management Studies as 'a focal point for management teaching and research in the University'.[205] The CSA, already shown to be deeply linked to the arms trade, was founded by the Judge Business School, along with the Institute for Manufacturing.

The School marks the pinnacle of the marketisation of higher education, advertising itself as 'being part of a world-renowned research university' with 'unrivalled opportunities for internal and external networking'. In addition, they boast of 'a rich local business community' in the Cambridge Cluster, or Silicon Fen, 'the most successful technology cluster in Europe and one of the most successful in the world'.[206]

Subject Groups

There are eight subject groups within the School and two boast of links with the arms industry. The Organisational Theory & Information Systems 'focuses on organisational theory and the dynamic relationship between information technologies and organisations'. Their website describes how the research agenda of the group is stimulated by regular contacts with senior personnel of large national and international organisations, including Rolls Royce and BAE Systems.[207] The Strategy & International Business group have 'spearheaded several research projects and grants funded by companies' including Boeing.[208]

Karim Ride Said Foundation (KRSF) Scholarships

The School also details external scholarships funded by the KRSF for Syrian, Palestinian, Lebanese and Jordanian candidates.[209] The foundation was set up by billionaire Syrian businessman Wafic Rida Said, who is alleged to be the fixer at the heart of the al-Yamamah arms deal between the British and Saudi governments through his connections to Mark Thatcher and the Saudi royal family.[210] Mike Turner, then-CEO of BAE Systems, said in 2005 that BAE and its predecessor earned £43 billion in 20 years from the contracts and that it could earn £40 billion more.[211] An investigation by the UK government's Serious Fraud Office (SFO)

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204 https://www.ifm.eng.cam.ac.uk/uploads/Resources/The_Defence_and_Security_Technology_Competency_Report_-_Spreads.pdf

205 https://www.jbs.cam.ac.uk/aboutus/

206 https://www.jbs.cam.ac.uk/aboutus/the-school/at-the-heart-of-cambridge/

207 https://www.jbs.cam.ac.uk/faculty-research/subject-groups/organisational-theory-information-systems/#item-4

208 https://www.jbs.cam.ac.uk/faculty-research/subject-groups/strategy-international-business/#item-4

209 https://web.archive.org/web/20220308043845/https://www.jbs.cam.ac.uk/programmes/mphils/mphil-scholarships/#item3

210 https://www.theguardian.com/baefiles/page/0,,2095831,00.html

211 https://web.archive.org/web/20080907153551/http://www.timesonline.co.uk/article/0,,2095-2320097,00.html

uncovered ‘commission’ payments, or bribes, totalling as much as £6 billion paid by BAE Systems to members of the Saudi royal family and others.

The Judge Business School has maintained its working relationship with BAE Systems in spite of this investigation and accumulating evidence of BAE’s complicity in War Crimes across the Middle East. Bizarrely, even though institutional ties remain, BAE’s illegal behaviour has been the subject of academic study within the Judge Business School. A 2020 study entitled ‘What determines the return to bribery? Evidence from corruption cases worldwide’ was co-authored by Raghavendra Rau of Cambridge Judge Business School and used allegations of bribery surrounding a $2.5 billion BAE contract to supply fighter jets to South Africa in 1999 as a key case study.[212] The paper found ‘robust support for a general link between the size of bribes and benefits firms receive – firms pay larger bribes when they expect to receive larger benefits’.

That corruption in industry is considered an academic issue, and unrelated to the ongoing partnerships with industrial partners, evidences the successful separation of these consultancy bodies from the partners consulting them.

Cambridge Institute for Sustainability Leadership

The Cambridge Institute for Sustainability Leadership (CISL) is a consultancy body which aims to develop ‘leadership and solutions for a sustainable economy’ ‘through focused collaboration between business, government and finance institutions’.[213] Each year, CISL works with ‘business, government and finance leaders in over 250 organisations including consumer brands, global banks and national governments, attracting more than 1,200 delegates into [its] programmes’.[214] CISL has offices in Cambridge, Brussels and Cape Town and operates in six global regions: the UK and Europe, sub-Saharan Africa, Latin America, Asia and the Middle East.

In 2022, CISL opened its ‘ultra green’ new Entopia building with an event attended by many of its ‘global partners’ focused on decarbonising the aviation industry. For Professor Stephen Toope, Vice-Chancellor of the University, the event was a ‘celebration of projects that have the power to change the way we live and the way our industries operate, hastening the transition to a low carbon world’.[215] What the publicity for the event neglected to mention was some of the ‘global partners’ represented were arms-producing companies and even an oil company. Boeing, BP and Rolls-Royce were among some of the attendees of the event, which was chaired by Prince Charles.[216]

Members of Demilitarise Cambridge and Extinction Rebellion Youth Cambridge met with CISL after the event to share their concerns about CISL’s greenwashing of corporations fuelling the climate crisis and war worldwide. They shared statements from communities impacted by Boeing and BP worldwide. A member made the statement “Whilst we welcomed

[212] https://www.jbs.cam.ac.uk/insight/2020/examining-bribery/
[213] https://www.cisl.cam.ac.uk/about
[214] Ibid.
[215] https://www.varsity.co.uk/news/23474
[216] https://mobile.twitter.com/DemilCambridge/status/1509897434520039447

the opportunity to meet with representatives of CISL, we found both transparency and accountability to be lacking."

For instance, CISL has no public due diligence policy for the companies they work with. During the meeting the creation of a public due-diligence policy was advocated, with both positive and negative screening criteria, as well as a commitment to publishing engagement with corporate partners. This should contain:

- A policy of exclusion for all companies that are continuing to explore new fossil fuel extraction and distribution possibilities.
- A policy of exclusion for all companies involved in the manufacture and distribution of arms to states complicit in human-rights abuses.
- A policy of exclusion for all companies implicated in the theft of water and land from indigenous communities.

Such a policy has yet to appear, but the constructive engagement of CISL with community organisations is a promising step in the right direction. Until CISL elects to adopt a policy of exclusion for arms companies like Boeing and Rolls-Royce, however, 'sustainable leadership' will continue to simply greenwash the arms industry and other ecologically-catastrophic sectors.

Greenwashing War

It is perhaps superfluous to consider the 'environmental' impact of the arms industry. Clearly the systematic destruction of human life cannot be separated from the destruction of the natural world: a 'sustainable' fighter-jet will never exist, because, as we have seen, what is being sustained by the products of BAE Systems, Rolls-Royce and other arms-producing companies are regimes of occupation, imperialism and military aggression.

Nevertheless, the ecological impact of the arms industry is useful in deconstructing the language of 'sustainability' and 'efficiency' with which many of these companies justify their collaborations with higher education institutions.

BAE Systems alone has an annual carbon footprint of 1.103 million tonnes of CO2 equivalent.[217] A 2020 report by Scientists for Global Responsibility (SGR), found that 'The GHG emissions of the military industrial sector [in the UK] in the financial year 2017– 18 [...] were 6.5 million tonnes of carbon dioxide (CO2) equivalent. This was greater than the direct CO2 emissions of about 60 nations'.[218] The report estimates this to be around a third of the actual total emissions produced by the UK arms industry, due to inadequate reporting practices from the Ministry of Defence. The US military likewise has a greater carbon footprint than many industrialised nations.[219] The world's militaries combined, and the

[217] https://www.baesystems.com/en/our-company/sustainability/the-environment-and-climate-change/historical-ghg-emissions/global-carbon-footprint-2019
[218] https://www.sgr.org.uk/sites/default/files/2020-05/SGR-DUK_UK_Military_Env_Impacts.pdf
[219] https://www.forbes.com/sites/niallmccarthy/2019/06/13/report-the-u-s-military-emits-more-co2-than-many-industrialized-nations-infographic/?sh=144e22e34372

industries that provide their equipment, are estimated to create 6% of all global emissions, according to SGR.[220]

These figures also exclude the broader ecological impacts of military hardware outside of their application, most notably the impacts of what the London Mining Network (LMN) terms 'Militarised Mining'. A 2020 report by the LMN reveals the vast amount of resources required to maintain - and expand - the military-industrial complex:

> The MOD's next generation of military hardware assembles at least 514,270 tonnes of raw materials. Scaling up the resources consumed by the UK military—which represents 2.5% of global military spending— would suggest a minimum demand of **20.6 million tonnes of minerals** to re-equip the world's armies over the coming decade, inevitably leading to billions of tonnes of toxic waste in the extraction process.[221]

This toxic waste is particularly notable in the production of nuclear weapons by companies including the Atomic Weapons Establishment, a regular sponsor of research at the University of Cambridge. The manufacture of a single nuclear bomb is estimated to produce 2,000 metric tonnes of radioactive uranium mining waste and four metric tonnes of depleted uranium.[222] LMN point out not only the effect of this technology in practice, but also the slow-burn ecological disaster which is a consequence of stockpiling nuclear weapons:

> Each warhead has the potential to destroy a radius of 1.8 kilometres, with progressively less destruction up to 8 kilometres. The toxic fallout injects dense smoke into the atmosphere and blocks incoming solar radiation, potentially leading to widespread climate cooling. Any major damage to the ozone layer would result in crop failures and mass famines. [...]
>
> Where nuclear weapons are unused, they must be decommissioned. While the MOD has retired 20 nuclear-powered submarines since 1980, all containing large amounts of radioactive waste, they have not managed to dismantle any. Independent calculations suggest that the MOD needs to dispose of 4,500 tonnes of hazardous material, with 1,000 tonnes being especially dangerous. Until 1983, the MoD dumped this waste straight into the ocean.

The UK currently maintains a nuclear arsenal of 120 weapons, with a stockpile of 215. The engines for the UK nuclear submarine fleet are entirely provided by Rolls-Royce.

The natural resources required to maintain the military-industrial complex come at the cost of communities in the Global South, who often face oppressive working conditions, paramilitary coercion and the environmental degradation of their communities as a consequence of mining companies in the Global North. The UK government themselves acknowledge that the demand for 'militarised mining' is not sustainable – although with a notable lack of concern for those doing the mining – with a 2010 inquiry by the UK parliament's Science and

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[220] https://www.theguardian.com/environment/2021/nov/11/worlds-militaries-avoiding-scrutiny-over-emissions
[221] Martial Mining, p.5: https://londonminingnetwork.org/wp-content/uploads/2020/04/Martial-Mining.pdf
[222] A. Majeed, 2004. 'The impact of militarism on the environment,' Physicians for Global Survival.

Technology Committee identifying a ‘long-term, stable source’ of cobalt, platinum, rare earth elements, and by-products hafnium and rhenium, as the ‘highest concern’ to the UK aerospace and arms industries.[223]

The LMN report also notes the significance of global military land use as further evidence that the military-industrial complex is at its core unsustainable. As demand for land for growing food, providing housing and rewilding grows, ‘up to 6% of the earth’s land mass is used for military training, including weapons and explosives testing, and using toxic chemicals to maintain and service equipment’.[224]

Clearly none of this comes into the realm of ‘sustainability’, and, if anything, is a convincing demonstration of how far corporate actors have come to define what is deemed ‘sustainable’, whilst the communities being poisoned, dispossessed or exploited by these corporations are actively ignored by most institutions in the Global North who continue to collaborate with companies like Boeing or BAE Systems.

The proposals for the National Centre for Propulsion and Power which we encountered in Section One are a good example. In particular, the proposals given to voting bodies have been criticised as ‘misleading’ and ‘a shameless greenwash of war and military operations’.[225] During a University Council discussion, the director of the Whittle Laboratory, Professor Miller, claimed that

> Over the last five years the Whittle Laboratory's primary focus has been to radically transform the UK propulsion and power technology development process making it at least ten times faster and ten times cheaper. We believe that 'injecting pace and simplicity' into technology development is key to the UK meeting the challenge of decarbonisation.[226]

‘Simplicity’ does not acknowledge the supply-chains which sustain Rolls-Royce - the Whittle Laboratory’s primary industrial partner. As the LMN report demonstrates, these are far from simple, and involve a multitude of violences. To suggest that working with corporations like Rolls-Royce is sustainable, or part of the transition to a just energy future, is entirely misleading, as another member of University Council commented, and serves only to greenwash and excuse military activity across the world.

[223] Science and Technology Select Committee, ‘Inquiry on Strategically Important Metals,’ 16 December 2010
[224] Martial Mining, p.5.
[225] https://www.admin.cam.ac.uk/reporter/2018-19/weekly/6555/section9.shtml
[226] Ibid.

6). Lethal Autonomous Weapons

Lethal Autonomous Weapons form a slightly different category of military research, research that designs weapons or the technological components for weaponry which would have the ability to kill without the need for a human being to operate the machine and, crucially, push the final trigger. The Organisation *Stop Killer Robots* claims that they are "an affront to human dignity" as "machines do not have the moral or empathetic capacity to decide whether we live or die." In addition, the UN Secretary General has described Lethal Autonomous Weapons as "morally repugnant" as they undermine current legal protections in war, are liable to racial and gendered bias, and increase the violent scope of war – particularly for civilians.

British universities are playing a key role in the government's and MoD's pursuit of autonomous Weapons Systems (AWS). Cambridge University argues that it does not contribute to AWS, yet it neglects to effectively safe-guard its research nor educate its researchers about the potential of these technologies. Technologies that advance AWS are inherently Dual Use: that is, innovations developed for civilian applications can also be applied directly or modified for use in military applications.

An investigation by *Stop Killer Robots* has identified Cambridge University as pursuing an 'amber' risk project developing autonomous agents, meaning that this is Dual Use technology with a strong capacity to be used in AWS.[227] The study found that Cambridge University is also involved with the Alan Turing Institute, who have been identified as pursuing 'red risk' projects, meaning that the purpose of the project is specifically related to military function. Moreover, Cambridge has promoted recruitment connections for students with companies that develop technology relevant to AWS, sometimes taking money to promote these companies to students through their 'Supporters Club'.

Without a thorough, robust and specific policy in regard to AWS, Cambridge University is complicit in their research being used to further the developments of killer robots. The decision to end human life should not be left to algorithms.

[227] https://una.org.uk/KRUniReport

7). Dismantling the military-academic complex

Introduction

This report documents the close relationship between Cambridge and the arms industry; a relationship founded on mutual convenience and callous disregard for the victims of war. Activism and engagement by students, the local community, and university faculties is crucial to demilitarising the university in the long run.

The Emergence of Demilitarise Cambridge

On 15 May 2018, the most brutal day for the Great March of Return in Gaza, commemorating the 70th year of the Nakba, over 40 student groups from the university called for a boycott of BAE Systems and Caterpillar over their involvement in Israeli war crimes.

Demilitarise Cambridge came into being from this organising. The campaign began with research into investments in the arms industry, grants from arms companies, knowledge sharing and recruitment. We made demands in three areas. First, in ‘money’ we called for divestment from the arms industry, as well as democracy and transparency across the University's investments. Second, in ‘knowledge’ we called for direct funding from the military to stop, an end to the Cambridge Enterprise facilitating business in the arms industry and the termination of research partnerships. Third, in ‘people’ we urged the end of the revolving door between senior management and arms companies, as well as the presence of arms companies at recruitment events.

The campaign continued over the next academic year, with a campaign in November 2018 pushing Cambridge to cut ties with BAE Systems. Demilitarise Cambridge said at the time:

> Cambridge’s complicity in war crimes is not limited to financial investments, our campaigning will be scaled up in the coming weeks to target BAE Systems in particular. Cambridge maintains close links with BAE at the highest levels as part of the Cambridge Service Alliance, run out of the Judge Business School. Over 40 student groups jointly called for an end to this partnership in May 2018. Yemen stands on the brink of famine after destruction wrought in significant part by BAE, which provided the bulk of the £2.94 billion of arms exported to Saudi Arabia under the licence of the British government last year. Cambridge’s links to BAE and other arms companies undermine the values that we claim to hold, and ought to hold, as a place of learning and contribution to the world.

In November, after consistent agitation around arms, the Cambridge Service Alliance dropped BAE, confirming ‘BAE Systems is not a member of the Cambridge Service Alliance.’ In the same month, 300 students rallied calling on Cambridge and its colleges to ‘divest, disarm, decolonise’. In February the campaign coordinated and publicised a response to the news that the University was a final stage bidder for a £69 million contract with the Ministry

of Defence to create a for-profit consultancy with the military, serving the purpose of 'influencing human behaviour'.

When Demilitarise Cambridge asked Stephen Toope, the Vice Chancellor, for clarification on the Ministry of Defence bid, Toope confirmed that the Committee on Benefactions, External and Legal Affairs (CBELA) would review the reputational damage and ethical considerations of research bids 'prompted' by the Ministry of Defence bid and the response by students and staff at the university. Toope said that the committee would meet confidentially but it would be a 'public process' with ways for the community to participate and give their opinions. Toope also clarified that the Ministry of Defence dropped the bid while the University of Cambridge was still in the bidding process. The year ended with confirmation Emmanuel College had withdrawn nearly £2.9m from the arms companies Airbus SE and United Technologies, following a campaign by Divest & Disarm Emmanuel, which emerged from the demilitarise campaign.

After a period of dormancy, Demilitarise Cambridge was revived as a broad coalition in November 2021, addressing an open letter to Vice-Chancellor Toope signed by community and student groups including Cambridge Palestine Solidarity Campaign, Cambridge Stop the War, Cambridge University Amnesty International, Cambridge University SU Ethical Affairs Campaign, Cambridge University Palestine Solidarity Society, and Cambridge Defend Education.[228] Toope did not reply. Demilitarise Cambridge continues to fight to sever the ties between the university and the arms industry, recently storming a talk on 'sustainability' by Warren East, the CEO of Rolls-Royce, who was invited to the university to speak by King's Entrepreneurship Lab as well as running countless information campaigns.[229]

What is clear from these examples, besides that arms companies are not welcome on campus, is that protest and direct action send a clear message to the university management regarding their future decision-making. The University's Committee on Benefactions and External and Legal Affairs (CBELA) assesses proposed research funding on the basis of whether or not the collaboration will cause reputational harm to the university. A Freedom of Information request (FOI) sent by Demilitarise Cambridge in 2022 revealed that CBELA has voted to reject two grants from the SIPRI top 100 arms-producing companies in the last three years, Airbus and MBDA.[230] The university has not taken any research grants from Airbus since this funding was rejected. The full FOI response is listed here:

Company	Decision date	Decision	Reason
Airbus and KACST, Saudi Arabia	23/07/2020	Three-way collaboration not acceptable	High level of reputational risk relating to external parties
MBDA UK Ltd / MBDA Holdings SAS	13/03/2019	Collaborative research proposal and consortium not acceptable	High level of reputational risk relating to company's use of the research

[228] https://docs.google.com/document/d/1wtFcym17W8AJ5bA4d-rcq54JKQ0kMJUcuE6zajawpQo/edit
[229] https://twitter.com/DemilCambridge/status/1529919396088533015
[230] https://www.whatdotheyknow.com/request/876786/response/2095739/attach/2/FOI%202022%20497%20Brown%20response%20letter.pdf?cookie_passthrough=1

The Lucas Plan

The Lucas Plan was written by workers at the Lucas Aerospace Corporation in 1976 in response to plans to restructure the company and cut thousands of jobs. The plan argued that by moving away from military contracts and toward socially useful production, workers could both keep their jobs and benefit their communities. 150 product ideas were put forward. The plan received considerable domestic and international support but Lucas Aerospace management refused to implement it.[231]

In the context of the climate emergency and the scourge of war, including the omnipresent risk of nuclear war, the plan remains a model for efforts to transition from an economy that serves the few to an economy that serves the many. A New Lucas Plan would involve converting the arms industry into a producer of useful technologies that are desperately needed to confront the challenges of the twenty-first century. Demilitarising the university contributes to this goal by focusing research on those very challenges and sanctioning arms companies for their criminal conduct, incentivising them to instead transform their business models.

The Campaign Against the Arms Trade (CAAT) has produced a series of detailed reports on how such a transformation could be implemented, with an emphasis on renewables. It is the misallocation rather than the absence of funds that is the problem: in 2014, the government spent 30 times more on research and development for weapons than for renewables.[232] Arms manufacturers on the River Clyde could become leaders in wave power technology.[233] Excellent conditions for the development of offshore wind power in the UK could create 150,000 new jobs, replacing careers related to the supply of lethal weapons.[234] A self-defeating approach to national security based on militarism and the proliferation of wars in some of the poorest parts of the world could be replaced by the real security offered by sustainability, respect for human rights, and international diplomacy.[235] All this is possible, and the university can play an admirable role if it commits to severing ties with the arms industry.

Policy Models

- Pledges not to work on socially irresponsible and destructive projects have gained traction in recent years. In 2018, 274 organisations (including higher education institutions such as University College London) and over 3800 scientists and technology professionals called upon ‘governments and government leaders to create a future with strong international norms, regulations and laws against lethal autonomous weapons.’ They continued:

[231] https://lucasplan.org.uk/story-of-the-lucas-plan/
[232] https://caat.org.uk/app/uploads/2020/03/arms-to-renewables-background-briefing.pdf
[233] https://caat.org.uk/app/uploads/2020/07/clyde-case-study.pdf
[234] https://caat.org.uk/app/uploads/2020/03/arms-to-renewables-background-briefing.pdf
[235] https://caat.org.uk/app/uploads/2020/03/fighting-the-wrong-battles-feb2020.pdf

> These currently being absent, we opt to hold ourselves to a high standard: we will neither participate in nor support the development, manufacture, trade, or use of lethal autonomous weapons.[236]

- Ethical investment criteria typically exclude significant investments in the tobacco or gambling industry. Many Cambridge colleges already have such policies, and rationally these should preclude relations with arms manufacturers given they are responsible for comparable if not greater harm. In 2002, CAAT inaugurated a Clean Investment campaign demanding that universities, local authorities, charities and other institutions cease investing in the arms industry. CAAT argued

  > It is wrong that organisations promoting social good at home, earn money from investing in companies that sell weapons into conflict areas and openly seek to divert resources away from development abroad … We call on these institutions to realise that arms companies can do as much damage as other types of companies, such as cigarette manufacturers, and to include them under any ethical investment criteria they may have.[237]

[236] https://futureoflife.org/lethal-autonomous-weapons-pledge/
[237] https://caat.org.uk/news/2002-03-17-2/

8). Demands

The University of Cambridge must take action immediately to end its role in the military-academic complex. It must actively recognise its historical and continuing contribution to military and arms companies, as well as its support of some of the most oppressive and destructive conflicts on the globe. We call on the University to implement the following demands:

1. Stop accepting donations and research grants from military and arms companies: Accepting donations and grants legitimises arms companies and their deadly trade.

2. Cut all arms-related research conducted by the University: the University should not devote research to discovering more effective ways of killing.

3. Establish a programme to find alternative modes of funding for researchers: as arms-related research shrinks, the University should create a sustainable mechanism for funding alternative research, for example into climate solutions and renewables.

4. End formal consultancy and training of arms companies: all University bodies, including the Institute for Manufacturing and Cambridge Service Alliance, must pledge to halt lending their training and consultancy services to arms companies and personnel.

5. End the revolving door of the military-academic complex, which allows arms companies to target students for recruitment and research, often without full transparency as to what students' labour and research is intended for.

6. Cease all activity that may contribute to the development of Autonomous Weapons Systems until the university has created a specific policy to assess the risk of, and prevent, dual use research.