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Defence Committee

Remote Control: Remotely Piloted Air Systems – current and future UK use

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Written evidence

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List of written evidence

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Written evidence

Written evidence from the Ministry of Defence

1. Introduction

1.1 This memorandum provides written evidence for the House of Commons Defence Committee's Inquiry into Remotely Piloted Air Systems—current and future use.

1.2 Drawing on the Ministry of Defence's (MOD) experience of owning and operating these systems, it will examine:

- Nomenclature—defining associated terms.
- Current use and Dispersal—explaining what the MOD uses these systems for and where?
- Lessons on their use from Afghanistan.
- Tomorrow's Potential—detailing MOD plans for their development.
- Constraints—commenting on constraints imposed by Airspace Regulation and the environment.
- Legal and Ethical issues.

2. Nomenclature—Defining what is meant by the Terms Remotely Piloted Air Systems (RPAS), Unmanned Aircraft Systems (UAS) and Associated Terms

2.1 The origins of unmanned aircraft can be traced back to the First World War. But the last decade has seen extraordinary development and rapid progress in unmanned aircraft technology and capability. Much of the original terminology has, as a result, become outdated and manufacturers and operators have created a new descriptive language for the aircraft, their capabilities and consequent issues. As systems have matured, there is also an increasing requirement for standardised terminology.

2.2 To help avoid confusion and prevent misunderstanding, in 2010 and 2011, the MOD produced Joint Doctrine Note (JDN) JDN 3/10—Unmanned Aircraft Systems (UAS): Terminology, Definitions & Classification and JDN 2/11—The UK Approach to UAS. These documents outline the standard UK military terminology and classification to be used when describing UAS within UK Defence and when working with NATO and other international partners. UK based academia and industry are encouraged to adopt the standard to improve interoperability. Both JDNs are in the public domain and can be accessed through the Defence section of www.gov.uk.

2.3 The term Unmanned Aerial Vehicle (UAV) had previously been used extensively in the UK. But it is no longer aligned with NATO thinking and, in the interests of interoperability, UAV should now be considered a legacy term. A recent NATO Joint Unmanned Aerial Vehicle Panel was tasked to re-examine unmanned aircraft related terminology from first principles and to make recommendations on the way ahead; JDNs 2/11 & 3/10 largely reflect the outcome of that discussion and subsequent recommendations.

2.4 The following are terms defined in JDNs 2/11 & 3/10:

2.5 *Unmanned Aircraft (UA)*

> *An Unmanned Aircraft (sometimes abbreviated to UA) is defined as an aircraft that does not carry a human operator…*

2.6 *Unmanned Aircraft System (UAS)*

> *An Unmanned Aircraft System (UAS) is defined as a system, whose components include the unmanned aircraft and all equipment, network and personnel necessary to control the unmanned aircraft.*

2.7 UAS is the generic term that defines the totality of the components of an unmanned aircraft, together with the other necessary components including all equipment, networks and personnel. The MOD operate a range of UAS principally for surveillance and reconnaissance purposes.

2.8 Although UAS is the preferred term in a military environment, there are occasions when such a generic term is unhelpful. The term "unmanned" can cause confusion or uncertainty over the actual level of human control and has led to safety, ethical and legal concerns being raised, particularly with regard to the employment of weapons and flight in non-segregated airspace. These concerns can be addressed in part by using terminology that better describes the level of human control of such aircraft as being equivalent to that of piloted aircraft; the pilot is simply physically remote from the aircraft itself. Consequently, the MOD believes it is more appropriate to use the term Remotely Piloted Aircraft (RPA) to describe such aircraft, and Remotely Piloted Air(craft) System (RPAS) to describe the entirety of that which it takes to deliver the overall capability.

2.9 *Remotely Piloted Aircraft*

> *A Remotely Piloted Aircraft is defined as an aircraft that, whilst it does not carry a human operator, is flown remotely by a pilot, is normally recoverable, and can carry a lethal or non-lethal payload.*

2.10 *Remotely Piloted Air(craft) System (RPAS)*

> *A Remotely Piloted Air(craft) System is the sum of the components required to deliver the overall capability and includes the Pilot, Sensor Operators (if applicable), RPA, Ground Control Station, associated manpower and support systems, Satellite Communication links and Data Links.*

2.11 RPAS is thus a specific class of UAS. It is appropriate to use the term RPAS to emphasise the reality that a trained professional pilot is in control of the system. Of note, the critical legislative aviation authorities, the International Civil Aviation Organisation (ICAO) and the European Aviation Safety Agency use the term RPAS.

2.12 *Unmanned Combat Aircraft System (UCAS):* UCAS is a proposed class of UAS with offensive and defensive capabilities on a par with current manned systems to allow them to operate in contested airspace when necessary. Such a capability does not yet exist.

2.13 *Automation and Autonomy.* There is often a misconception that UAS are autonomous systems. This is not true as there is always a human involved in the decision making process. Industry and academia often discuss automation and autonomy interchangeably, referring to technology research for all types of UAS. There are no universally agreed definitions. But the MOD defines autonomy as a machine's ability to understand higher level intent, being capable of deciding a course of action without depending on human oversight and control. Automation refers to a system that is programmed to logically follow a pre-defined set of rules with predictable outcomes, such as an automatic landing system. Improving capability can include automating part of a process to make the remote Pilot or operator's job easier. But current UK policy is that the operation of weapon systems will always be under human control. No planned offensive systems are to have the capability to prosecute targets without involving a human.

2.14 It should be noted that most existing manned aircraft terminology remains equally relevant to unmanned aircraft operations.

3. Current Utility and Dispersal

For what purposes are UAS and RPAS currently used?

3.1 The UK currently only deploys UAS in support of operations in Afghanistan.

3.2 UAS are predominately used for intelligence, surveillance and reconnaissance (ISR) tasks providing vital intelligence in support of our forces on the ground. They can provide persistent full motion video (optical and infra-red) and Synthetic Aperture Radar (SAR) images (platform dependant), for the development of situational awareness in order to conduct planning. These formats can also be converted into still images. The data can also be disseminated rapidly for analysis in the UK. While the utility of the sensors is broadly similar to those on board conventionally manned aircraft, UAS have the ability to loiter for longer, building an intelligence picture that significantly enhances the situational awareness of commanders on the ground and aircrew. In Afghanistan UAS provide intelligence in support of our ground commanders, enabling them to stay one step ahead of the enemy. Whether for targeting the Taliban or supporting troops on patrol, their ability to loiter over and survey areas for enemy activity and then feed back images and video in real time means they are an invaluable asset to our forces on the ground. Together, the UK's fleet of UAS have carried out over 160,000 hours of ISR operations.

3.3 The UK REAPER RPAS can also conduct strike operations against positively identified targets using precision munitions. REAPER is the only armed UK RPAS. It does not have the capability to fire weapons autonomously and can only fire its weapons when commanded to do so by the fully trained and qualified flight crew. When tasked to attack a target, qualified REAPER pilots can select from two types of precision-guided weapons. They will select the smallest warhead appropriate to the target being attacked, and every effort is made to avoid civilian casualties, aborting attacks when necessary as is the case with manned aircraft. The policy for their use is the same as that for manned aircraft. Their persistence means aircrews usually observe a target area for a significant period prior to, and following, an engagement. This allows them to assess target validity, the likelihood of collateral damage and to observe the consequences of an attack in detail. Associated legal issues are discussed later at Section 7. By 31 August 2013, the UK's only armed UAS (REAPER RPAS) had flown over 50,000 hours on operations in the ISR role. In the same period 418 precision-guided weapons were fired from REAPER.

3.4 UAS can also be used as communication relay platforms for ground forces, aircraft and maritime units.

What UAS capability does the MOD currently possess or operate?

3.5 The British Army currently operate four unarmed UAS systems in Afghanistan. All were procured on an Urgent Operational Requirement (UOR) basis. They are Hermes 450 (a Tactical UAS)—Desert Hawk—Tarantula Hawk, which operates solely as part of the TALISMAN Improvised Explosive Device (IED) route clearing capability, and BLACK HORNET, a hand launched nano-UAS (ie miniature UAS). Army operated UAS are used for passive ISR purposes only. They are not armed, and have no offensive role. Their current purpose is to support UK, ISAF and Afghan forces. The supported forces will submit an ISR request in advance

and, once a UAS has been tasked, the mission will be planned in close cooperation with the Ground Force, and communications maintained throughout the mission to ensure threats and opportunities are exploited rapidly.

3.6 The RAF operate REAPER. This is the UK's only armed RPAS and has been armed with precision-guided weapons since May 2008, providing an offensive capability if needed by ground commanders.

3.7 The Royal Navy plan to operate SCANEAGLE beginning later this year which is a working surveillance system. A concept demonstration was conducted for the Royal Navy from a Bay Class Royal Fleet Auxiliary (RFA) ship during December 2012. In June 2013 Boeing UK was awarded a contract for Maritime UAS in support of Royal Navy and RFA ships. The SCANEAGLE system was developed by Insitu and is currently in service with nine other nations and operated from more than thirty platforms.

3.8 Table 1 below provides details of MOD's current range of UAS.

Table 1

CURRENT MOD SYSTEMS (AS AT 1 APRIL 2013)

UAS	*Number of UAS*	*Comments*
REAPER 	5	REAPER RPAS is a medium altitude, long endurance remotely piloted aircraft system providing ISR capabilities to UK and coalition ground forces in Afghanistan. It is the only armed RPAS used by the UK. The aircraft fleet is rising to ten aircraft during 2013 as the new aircraft are accepted into service. RAF aircrew operate the aircraft in Afghanistan from control stations based at RAF Waddington, Lincolnshire and Creech Air Force Base in the United States. Since it came into service in 2007 REAPER has flown over 50,000 hours on operations supporting ground forces in Afghanistan.
HERMES 450 	8	HERMES 450 is a Tactical UAS providing ISR capability (principally video) in support of UK ground forces in Afghanistan. The system is provided to the UK MOD via a service provision contract with Thales. HERMES 450 is operated by 1st Artillery Brigade. Since it came into service in 2007 HERMES 450 has flown over 84,000 hours on operations supporting ground forces in Iraq and Afghanistan.
DESERT HAWK III 	222	DESERT HAWK III is a mini UAS providing an organic ISR capability (principally video) to Platoon, Company and Battle Group level ground forces in Afghanistan. Currently there are 12 DESERT HAWK III systems operated in Afghanistan. The majority of these systems are operated by 1st Artillery Brigade. Each comprises between eight and ten aircraft. Since it came into service in 2007 DESERT HAWK III has flown over 27,500 hours on operation in support of forces in Afghanistan.

UAS	*Number of UAS*	*Comments*
BLACK HORNET 	324	BLACK HORNET is a nano UAS providing "over the wall" ISR capability (video) and is operated by the Infantry. There are 162 systems in operation. Each complete system comprises a handheld controller, a display, a base station and two Black Hornet Aircraft.
TARANTULA HAWK 	18	The TARANTULA HAWK (T-Hawk) is a mini UAS, part of the TALISMAN Route Proving and Clearance capability and is used for C-IED Convoy Protection on operations. T-HAWK is operated by 1st Artillery Brigade soldiers embedded in the Royal Engineer squadron.

What Governance and Oversight arrangements are in place for the use of UAS in the UK and overseas?

3.9 UK governance and oversight arrangements for UAS deployed on operations are exactly the same as those used for all UK forces. The same strict ROE that govern the use of conventional military aircraft also apply to UAS operations in Afghanistan. UAS do not currently operate in the UK or elsewhere other than for training or trials purposes.

3.10 All UK operations are authorised by Ministers and directed by the Chief of Defence Staff (CDS) in accordance with agreed plans. The chains of command for the tasking of UAS in Afghanistan are summarised below:

Army Operated UAS (Hermes 450, Dessert Hawk III, T Hawk, Black Hornet):

Full Command—Chief of the General Staff
↓
Operational Command—Chief of Joint Operations
↓
Operational Control—Commander Task Force Helmand

RAF Operated RPAS (REAPER):

Full Command—Chief of the Air Staff
↓
Operational Command—Chief of Joint Operations
↓
Operational Control—Commander ISAF
↓
Tactical Command—UK Air Component Commander

3.11 Definition of the command terms above can be found in Allied Joint Publication (AJP)-01(D): Allied Joint Doctrine and can be accessed through the Defence section of www.gov.uk.

3.12 As with UK manned combat aircraft, where operational control of UK RPAS is assigned to a Coalition Commander, such as the Commander of ISAF, the commander can only direct UK UAS operations within the constraints of UK ROE and policy. A UK officer "Red Card holder" is assigned to each ISAF HQ, with responsibility for coalition operations including the use of UK UAS, so that UK ROE and policy are strictly adhered to. Crews operating UAS receive training on a regular basis on domestic and international law concerning the use of force by UK forces in Afghanistan. Training includes the understanding of, and

compliance with, UK ROE. In addition, UAS crews have access to legal advice and support during operations 24 hours a day, every day of the year (this includes the ability to talk with legal advisors and commanders by phone if required, an option not available to crews of manned aircraft).

3.13 The UK policy relating to targeting by RPAS is exactly the same as that for manned aircraft (and land and maritime weapons where applicable). It is entirely compliant with International Humanitarian Law. Targets are always positively identified as legitimate military objectives and both pattern of life assessment and collateral damage estimate conducted. Strikes are carried out in accordance with the Law of Armed Conflict.

3.14 The ROE used for REAPER weapon releases are no different to those used for manned combat aircraft. The weapons are all precision guided, and every effort is made to ensure the risk of collateral damage and civilian casualties is minimised, which may include deciding not to fire a weapon. REAPER is not an autonomous system and does not have the capability to fire weapons unless it is commanded to do so by the flight crew.

4. Lessons Learned: From Operations in Afghanistan

4.1 There are a range of lessons that have been identified from seven years of operating UK UAS in Afghanistan. UAS have become important to support the never ending drive for better intelligence, precision and situational awareness. With the progress of technology and increasing appreciation of their military utility, the number deployed in Afghanistan has continued to grow. It is difficult to imagine a future campaign where such technology will not have a role to play.

4.2 The key UAS strength demonstrated in Afghanistan is persistence, which means that a lot more ISR can be achieved than is true from manned air platforms, whose endurance is often considerably less.

4.3 Persistence also maximises precision. The MOD is only aware of one incident involving an armed UK RPAS (REAPER), which resulted in the deaths of civilians. On 25 March 2011, an attack on two pick-up trucks resulted in the destruction of a significant quantity of explosives and the death of two insurgents. Sadly, four Afghanistan civilians were also killed. In line with current ISAF procedures, an ISAF investigation was conducted to establish if any lessons could be learned or if any errors in operational procedures could be identified. In that case, the report concluded that the actions of the REAPER crew had been in accordance with extant procedures and rules of engagement.

4.4 This in turn depends on highly qualified personnel. The UK experience of operating the REAPER RPAS in Afghanistan suggests that REAPER aircrew, despite being based at RAF Waddington and Creech Air Force Base in the US, are just as, if not more, connected to the situation on the ground in Afghanistan as compared to operators of other aircraft types. The increased information available to operators and subsequently ground commanders, the endurance of REAPER and the substantial operational experience of REAPER crews, whose years of experience flying missions over Afghanistan, results in an unrivalled depth of knowledge. This in itself can make a significant contribution to the safety and security of UK and coalition forces in Afghanistan, while also helping to minimise the risk to civilians.

4.5 In terms of the more tactical lessons to be drawn from Afghanistan it is a well established theatre, with adequate basing and lines of communication, operating in permissive (and relatively uncongested) air space, against a technologically unsophisticated adversary. The lessons may not be universally applicable.

5. Tomorrow's Potential—What Additional Capabilities will the UK seek to Develop from now to 2020?

5.1 The MOD is considering whether UAS (REAPER, DESERT HAWK III, BLACK HORNET, TARANTULA HAWK) acquired as UORs for Op HERRICK should be retained as core programmes or not, when UK forces redeploy in 2014. WATCHKEEPER will be the core UAS capability for Tactical Army ISR when it enters service. The MOD also has in place programmes that could deliver new UAS fleets in the period to 2020 and research to determine the future beyond that. Detail of future programmes is in paragraphs 5.2–5.7 and at Table 2 below. Legal issues regarding procurement and introduction into service are considered later in Section 7.

5.2 *WATCHKEEPER*. A tactical UAS, this is the UK MOD's largest current UAS procurement programme (approx £1 billion) and will provide operational commanders with unmanned day/night all weather capability to detect and track targets without the need to deploy troops into potentially sensitive areas. The system consists of unmanned aircraft, sensors, data links and ground control stations. There are no plans to fit weapons. The WATCHKEEPER Development, Manufacture and Initial Support (DMIS) contract was awarded to Thales UK (Prime) in 2005 and is being produced at UAV Tactical Systems Ltd (UTacs) in Leicester, UK. The first UK flight took place in Parc Aberporth, West Wales in April 2010 and since then over 400 hours of operational flight trials have taken place. WATCHKEEPER is planned to be delivered through an incremental development programme to allow the system to benefit from both existing and emerging future sensors and air vehicle technology. WATCHKEEPER did not achieve its forecast in-service date of April 2012 as the system was not yet proven against Release to Service regulations. The delay to the introduction of WATCHKEEPER into service is being mitigated by the continuation of the Hermes 450 service provision to ensure there is no capability impact on current operations.

5.3 *SCAVENGER.* The UK SCAVENGER Programme will deliver the future UK capability for deep and persistent armed ISR collect from 2018 to 2030, currently provided by the REAPER UOR. The programme is pre-Initial Gate. It is currently planned to be met by a Medium Altitude Long Endurance (MALE) UAS. A MALE UAS operates at approx 20,000ft and is capable of conducting ISR across a very wide area; it also has the potential to be armed and to therefore deliver a solution to meet the SCAVENGER requirement. The SCAVENGER Assessment Phase is focused on maturing and de-risking the sole-source acquisition of a future variant of REAPER, as a Military-Off-The-Shelf solution. The UK is still considering acquisition options to satisfy its SCAVENGER capability requirement, including retaining its REAPER as a Core Capability. Nothing has been ruled out and UK remains open to considering cooperative options.

5.4 *TARANIS.* The MOD has long held a requirement for capabilities that allow the timely engagement of targets deep behind enemy lines. While this has historically been fulfilled by manned aircraft, it is recognised that an UCAS could offer a cost-effective solution in the future. The TARANIS programme will result in a one-off flying Technology Demonstration Vehicle (TDV) comparable in size to a Hawk trainer aircraft. The current contract is for approx £180M. The TDV will demonstrate the successful integration of off-the-shelf technologies, including, automation, command and control, sensor integration, and payload integration. The TDV is not designed to drop weapons, but will include simulated weapon release as part of a mission representative scenario. UK policy is that there will always be a human in control of any decision making process involving weapons.

5.5 Any future in-service systems based on such a concept design will at all times be under the command of highly skilled ground-based crews controlling a platform able to operate in contested airspace behind enemy lines unlike current unmanned systems.

5.6 *Future Combat Aircraft Systems (FCAS).* The UK and France have a requirement to examine the options for the next generation of combat aircraft systems after Rafale and Typhoon are due to come out of service in the 2030 timeframe. One option being considered is UCAS. The FCAS Preparation Phase contracts are progressing. The UK must make a strategic capability decision at SDSR15 on FCAS and therefore the next phase of the programme is important to de-risk critical technologies, this work will underpin SDSR15 decision making.

5.7 *Maritime*. The introduction of SCANEAGLE will permit Royal Navy experience of operating UAS and lead to consideration of further UAS development in the maritime domain. In addition, concept work is being conducted to assess the viability of rotary wing UAS in the maritime domain to operate from smaller vessels although it remains in the conceptual development stage. The Navy aspires to introduce a fleet of assured and integrated UAS to deliver Mine Counter Measures, hydrographic capabilities, maritime surveillance and force protection functions.

Table 2

FUTURE MOD SYSTEMS

UAS	*Number of UAS*	*Comments*
WATCHKEEPER 	54	WATCHKEEPER is not yet in service and is planned to replace HERMES 450. WATCHKEEPER is the core Tactical Unmanned Aircraft System which will provide enduring ISR support to UK ground forces. It is equipped with a radar surveillance capability in addition to video. The original design and manufacturing contract was placed with Thales UK in 2005. The first UK flight took place in Parc Aberporth, West Wales in April 2010.
SCANEAGLE 		SCAN EAGLE is a UAS being delivered to meet a UOR for additional maritime surveillance. The capability is expected to start becoming available to the Royal Navy from late 2013 onwards. The capability will be provided as a service provision by the contractor (Boeing UK) and will initially consist of 300 hrs surveillance per month.

UAS	*Number of UAS*	*Comments*
SCAVENGER		SCAVENGER is the MOD's core requirement for a Deep and Persistent Armed ISR capability, from 2018. Analysis has indicated a medium altitude, long endurance RPAS-class system is the most cost-effective solution. MOD is considering acquisition options from around the globe. At this stage the UK has not ruled out any possibilities and potential opportunities remain for international co-operation.
MARITIME UNMANNED AIR SYSTEMS		The Royal Navy has awarded a contract to Agusta Westland to provide a Capability Investigation and Concept demonstrator of an unmanned rotary wing air system. The air vehicle used for the demonstration will be a 1.8 ton helicopter which will demonstrate radar, electro-optics, mine counter measures and hydrographic survey capabilities.
TARANIS 		Project TARANIS is a UCAS technology demonstrator programme focusing on the next generation of Low Observable intelligence and attack aircraft. It will provide the MOD with experimental evidence on the potential capabilities, helping to inform decisions on the future mix of manned and remotely piloted systems. UCAS will not replace any of the RAF's front-line aircraft in the short term, but in the longer term a mix of manned fast-jets and UCAS could be used on operations. TARANIS ground tests commenced in 2010 and flight trials took place in 2013. TARANIS investment will be exploited in Future Combat Aircraft Systems which will offer more advanced capabilities compared to the current generation of aircraft. Given the nature of combat operations there will always be a role for highly skilled operators and pilots to ensure that remotely piloted combat missions are conducted appropriately, proportionately and legally.
FCAS		The UK and France have a requirement to examine the options for the next generation of combat aircraft systems after Rafale and Typhoon are due to come out of service in the 2030 timeframe. One option being considered is Unmanned Combat Aircraft Systems and work has commenced scoping a cooperative Demonstration Programme.

What Current and Prospective Partnerships working on UAS is the UK Engaged in?

5.8 *Industry:* ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation and Assessment) is a UK industry-led consortium which is focusing on the development of technologies, systems and procedures with a specific emphasis on unmanned aircraft systems. It was created in 2006 to research and demonstrate how a remotely piloted aircraft could be safely integrated into airspace shared with other aircraft. The consortium is unique in its holistic approach to the challenge, addressing both the human-side of the equation (legislation and the operational control of remotely piloted aircraft), and the technical challenges.

5.9 The consortium is led by seven UK companies (AOS, BAE Systems, Cassidian, Cobham, Qinetiq, Rolls Royce, Thales) plus a further 70 SMEs and universities. The aim of the programme is to enable the routine use of UAS in all classes of airspace without the need for restrictive or specialised conditions of operation. It is a £62 million programme, which was split into two phases (each lasting for three years). Phase 2 ended on 31 March 2013; 50% of the funding came from the industry partners, with the remainder from government.

5.10 The MOD is an observer of ASTRAEA, not an active participant. It is impressed with the consortium's approach and progress to date.

5.11 *Multinational*. The UK will continue to support the Anglo-French Defence and Security treaty through all of its cooperative equipment programmes. At the 2012 Summit UK and France agreed to examine cooperation opportunities for WATCHKEEPER and an initial study concluded that there was potential for mutual benefit as a result of cooperating on the system. The UK agreed to support France to conduct an Operational Assessment of the system in France to help inform their investment decision for a Tactical UAS. In order to facilitate the Assessment, UK MOD established a Memorandum of Understanding (MOU) to provide access to the WATCHKEPER training facility and the loan of UK MOD equipment to enable live flying in France. The WATCHKEEPER MOU was signed by Defence Ministers on the 24 July 2012. As described above, UK and France are also examining remotely piloted systems as an option for the next generation of combat aircraft systems.

6. Constraints on the use of UAS in the UK and Overseas

6.1 The Secretary of State for Transport has policy responsibility for the operation of civil RPAS (the preferred civil term). All civilian operations are closely regulated by the Civil Aviation Authority (CAA), such as the regulation in the CAA's CAP722 (UAS: UK Airspace Guidance) and are treated in the same manner as that of an equivalent manned aircraft. This applies to all aspects of "unmanned" aviation, from the initial design and construction, or airworthiness, through to the safety requirements of how it is flown and operated. This viewpoint is shared internationally. For the smaller sized, lightweight systems (referred to as small unmanned aircraft) which are flown at short range and always within the sight of the person flying them, these are overseen to a lesser extent by the CAA, proportional to the level of risk involved.

6.2 The Government recognises the importance of the growth of the remotely piloted part of the aviation sector and the need to support the further development of associated technologies. The overall objective of the Government and also the European Commission, is to enable the full and safe integration of RPA into the total aviation system, sharing the same airspace as their manned counterparts. The UK is actively contributing to the development of harmonised, international RPAS regulations. The International Civil Aviation Organisation (ICAO) is currently developing RPAS Guidance Material, due for publication in autumn 2014, with Standards expected about two years later. The European Commission's RPAS Roadmap was published on 20 June 2013. This sets out the milestones and timing aimed at an incremental integration of RPAS into European airspace from 2016, with the publication of Implementing Rules for operations, personnel licensing and certification from 2018 onwards.

6.3 RPAS *Operating in the UK* Just like manned aviation, the avoidance of collisions is the primary concern while an RPAS is in flight. With this in mind, RPAS operations are split into two basic categories and are either flown within the "visual line of sight" of the pilot, which is described as "VLOS", or they are flown "beyond the visual line of sight" of the pilot, which is described as "BVLOS".

6.4 For VLOS operations, the pilot discharges his responsibilities to "see and avoid" other aircraft and obstructions by directly observing the RPAS and the airspace surrounding it. This is the same way that model aircraft are flown and indeed, the same basic requirements apply. The effectiveness of visual observation is clearly limited by the size and colour of the UAS, the weather conditions and the surrounding landscape; for these reasons, VLOS operations are normally only accepted out to a maximum distance of 500m horizontally, or 400ft vertically, from the Remote Pilot.

6.5 In order to cater for the lack of a pilot in the aircraft "looking out", RPAS that are intended to be flown BVLOS must be equipped with an alternative method of collision avoidance. This requires a technical solution, generically termed "Detect And Avoid" (DAA). Without such a collision avoidance system, an RPAS's flight must be contained within segregated airspace, to which access for manned aircraft is prevented or closely controlled. The development of an effective DAA system is key to the safe integration of RPAS. While DAA systems are under development worldwide, none have yet been approved for RPAS use in non-segregated airspace.

6.6 At present, there is a steadily growing "community" of civilian RPAS operators within the UK, although all are working at the "small unmanned aircraft" end of the scale and are flown at very short range, within the visual line of sight of the pilot. The majority are less than 7 kg mass, which has many parallels with recreational model flying. It is viewed as being simpler, available and relatively affordable but tends to attract individuals or organisations with little or no previous aviation experience.

6.7 Activity at the larger end of the scale, where the "flying" element of the system is of a size more comparable to a manned aircraft, is taking much longer to establish itself; this is directly related to solving the additional technical challenges associated with flight at greater distances and altitudes, in particular, the airworthiness requirements and the capability to avoid collisions.

6.8 Within this larger sized sector, WATCHKEEPER is the only system currently flying in the UK and is undergoing Test and Evaluation flights at Aberporth (which utilises West Wales Airport and a segregated airspace both over water and over land), before entry into service with the Army. Some organisations have

made initial approaches to the CAA in order to commence the certification process but as yet there are no large civilian RPAS flying in the UK.

6.9 *UK Regulation and Airworthiness*. The safe operation of civil RPAS in the UK is governed by the requirements of the Air Navigation Order 2009 (ANO). RPAS with an operating mass of more than 20 kg (60g for military UAS) are subject to regulation as though they are manned aircraft. RPAS with an operating mass of 20 kg (60g for military UAS) or less are referred to as "small unmanned aircraft". These are exempt from the majority of the regulations that normally apply to manned aircraft; however their use is specifically covered by two articles within the ANO, which legislate for the "general" flying aspects and the flight of those equipped for surveillance. As well as these specific articles however, a more general article which prevents a person "causing or permitting an aircraft to endanger the safety of any person or property" also remains applicable. Military registered UAS are regulated by the Military Aviation Authority (MAA). Currently, the MAA does not differentiate the regulatory requirements based on the size of the UAS. As with all other aircraft, RPAS will only be permitted to operate in UK airspace if it is considered that it is safe for them to do so. RPAS specific airworthiness regulations are in the early stages of development, but this is being done on an international scale, with a view to global harmonisation, rather than the UK "going it alone".

6.10 There are no specific airworthiness standards for civil RPAS with a mass of 20 kg or below. Specific standards for such small aircraft would be disproportionate to the size and relative risk to third parties. It is the responsibility of the "person in charge" of the small unmanned aircraft to satisfy him/herself that the flight can be safely made and, while flying the RPAS, he/she is required to operate it in a way that will not endanger any person or property. In certain circumstances however, the CAA might require additional airworthiness assessments for small unmanned aircraft—for example, for flights over people, or flights which will go beyond the visual line of sight of the pilot.

6.11 All military aircraft are operated under the authority of the Duty Holder (DH). DHs are personally nominated for each platform and are legally accountable and answerable to the Secretary of State for Defence for the safe operation of the platform under their control. The DH has to personally ensure that the risk to life from the operation of the platform is tolerably safe and that such risks have been reduced to As Low as Reasonably Practicable (ALARP).

6.12 *Military Use*. There are numerous constraints on the Military use of UAS in the UK and Overseas which include, but are not limited to, the following:

- *Use of Airspace and Safety.* Probably the greatest constraint upon the operation of military UAS within the UK is the lack of Sense-and-Avoid technology. WATCHKEEPER is being fitted with a system that will make it compliant with International Civil Aviation Organization (ICAO) standards. All UAS that require ICAO approval should be fitted with similar systems in order to ensure that training flights and broader civilian applications are possible outside of Segregated Airspace (reserved for UAS flights). This may also become a consideration if operating platforms overseas with similar air operating standards, such as supporting humanitarian relief operations.
- *Basing*. In order to utilise UAS in the most efficient manner, they should be based as close as possible to the target area of interest allowing for the longest loiter time possible. In non-permissive environments this becomes extremely difficult. Larger platforms' reliance upon an airfield potentially reduces their utility, and consideration must be given to basing within a permissive location, which may create additional burdens (force protection, Command & Control, logistics etc).
- *Command Delay.* When operating at distance via satellite relay, UAS suffer from a very slight command delay so that inputs into the controls from the ground station take a brief time to reach the aircraft. There are robust procedures to deal with it. The main challenge is for take off and landing, leading to the need for a VLOS pilot at the airfield.
- *Weather.* One of the greatest constraints to UAS is the effects of weather. This is the case for all aircraft, but can be particularly difficult for lighter airframes to manage and significantly constrains their flying hours in certain environments, such as areas that suffer from high cross winds, icing or lightning strikes.
- *Electromagnetic Environment (EME)*. The use of UAS is entirely dependent upon data feeds. They also require access to frequencies and spectrum to operate.

7. Ethical and Legal Issues Arising from the Use of RPAS

7.1 The UK operates UAS in Afghanistan under the authority of UN Security Council resolutions. The governance and accountability arrangements in place for UK operated UAS are the same as those for manned aircraft.

7.2 *Legal Issues*. The UK complies fully with all of its obligations under international humanitarian law irrespective of the weapons systems used. This includes those set out in Article 36 of Additional Protocol I to the Geneva Conventions to review all new weapons, means and methods of warfare to determine whether the employment would in some or all circumstances be prohibited by the Protocol or any other rule of international

law. That process applies to UAS just as to manned capabilities. The UK is also a signatory to the Missile Technology Control Regime, which controls the proliferation of unmanned delivery systems. The weaponisation of REAPER was reviewed under this basis in accordance with all relevant domestic and international law before its introduction into service.

7.3 UK forces operate UAS at all times in accordance with international humanitarian law (also referred to as the Law of Armed Conflict), following the principles of *distinction, humanity, proportionality* and *military necessity*, and this is reflected in the ROE. Both the ROE used for REAPER weapons systems and the legal issues associated with UAS are no different to those for manned aircraft.

7.4 The RAF has well-established command, control, supervisory, training and qualification frameworks for conducting air operations and makes full use of these structures to ensure REAPER are used in a legal and ethical manner. Crews receive training on a regular basis on domestic and international law concerning the use of force by UK forces in Afghanistan and the legal basis of UK involvement in supporting operations in Afghanistan. Training includes the understanding of, and compliance with, UK ROE. In addition, REAPER crews have access to legal advice and support during operations 24 hours a day, every day of the year.

7.5 *Ethical Issues*. The MOD welcomes the debate surrounding the ethical and legal aspect of UAS.

— *Strike*. The majority of ethical and legal issues relating to UAS regard their use as a strike platform rather than in an ISR role (although this could become a consideration in terms of invasion of privacy issues). The same legal targeting implications apply to UAS as to any other weapon system. Therefore, we do not believe that UAS represent a separate ethical or legal category. MOD does not operate UAS with a strike capability outside of Afghanistan.

— *Removal of a Man in the Loop*. A common observation is that the removal of a pilot from the cockpit reduces situational awareness which combined with distance from the "action" can lead to degradation in the ability to make appropriate judgement calls. However the use of UAS still requires a conscious decision to be made whether to prosecute a target, and often the situational awareness offered by numerous information feeds into a HQ is greater than that of a pilot operating in isolation, potentially facilitating wiser judgement calls to be made. Consequently, the operation of UAS should be seen as part of a system of systems which optimises decision-making by trained officers.

  Is the use of Armed UAS Moral? The greater persistence afforded by REAPER can act as a deterrent to insurgent activity as well as affording the pilot a much wider attack window of opportunity should target engagement be necessary and proportionate. Because of this, and the greater loiter-time of REAPER (affording a detailed assessment of any target, and the ability to select the optimum time for an attack which minimizes the risk of civilian casualties or unnecessary damage to property), crews are able to exercise their judgement in a more measured way, free from the stresses of the combat zone or concerns about survivability. This minimises the risk of civilian casualties and increases confidence levels in target identification while at the same time reducing the risk to our own forces.

  Some have argued that distance from the battlefield introduces an emotional and possibly moral disengagement. It is true that REAPER crews do not face the same level of direct danger as crews of conventional aircraft. However crews are commonly assigned to REAPER operations for several years and may fly missions in Afghanistan over extended periods, rather than on the short deployments associated with conventional crews. Experience of REAPER shows that aircrew are fully immersed in the reality of combat, possibly to an even greater extent than operators of conventional-aircraft. The persistence offered results in crews observing the aftermath of their attacks: a sobering experience rarely shared by other pilots or artillerymen. Furthermore, viewing the battlefield indirectly through sensors or targeting systems is far from new or unique to REAPER operators.

— *Is the use of REAPER Fair?* There are those who argue that use of REAPER is somehow unfair. But warfare is not a competition held on equal terms. There is nothing new about the lawful use of novel technology to achieve advantage in combat. We aim to maximise our war fighting capability and have a moral duty to protect the lives of our servicemen and women to the best of our ability. The use of UAS in a wide variety of roles, including for example C-IED route clearing, also contribute to our mission to protect civilians. Being able to provide persistent surveillance and attack capabilities from REAPER is part of our asymmetric advantage, and UAS are often important to mission success.

— *Will The UK Allow Autonomous Release Of Weapons?* No. Current UK policy is that the operation of weapon systems will always be under human control and that no planned offensive systems are to have the capability to prosecute targets without involving a human. By retaining highly-trained and qualified aircrew at the heart of the decision making process, the UK ensures that the legal requirements governing the use of force during armed conflicts are observed. There are no plans to replace military pilots with fully autonomous systems.

8. Conclusion

8.1 As this paper shows, UAS are subject to the same governance and supervision as manned platforms and will always have military personnel in control of them. The technology is here to stay, has clear military utility and is currently helping save the lives of British and coalition forces, as well as Afghan civilians, on a daily basis.

September 2013

Written evidence from the Royal United Services Institute

Remotely Piloted Air Systems (RPAS) is the term used by the British military amongst others to describe aerial platforms requiring no present human user aside from ground-based crews.

RPAS Capabilities

Nano RPAS

Nano RPAS are the smallest class of autonomous systems with a range of around 30 minutes, generally powered by a very small electric motor. The size is generally such they can fit in the palm of the users hand. Sensors used on these platforms are generally of a low quality and available only in the visible waveband, with data transmitted over unsecured and low bandwidth.

An example of a nano RPAS is the British Army-operated Proxy Dynamics *Black Hornet Nano*, a micro helicopter. The dimensions of this RPAS, 10cm x 2.5cm, allow for a small camera for low-resolution image capture in scenarios such as infantry local-area reconnaissance, especially in the urban environment. Able to be hand launched and using portable ground stations the whole system is transportable and suitable for use in the field.

Miniature RPAS

Miniature RPAS generally have a range for flight of less than 3 hours and are powered by small electric motors. The small size lightweight design, achieved through the use of composite and plastic materials, means that Miniature RPAS are used for the purpose of short-range surveillance using small and fairly basic sensors. The size and weight allow platforms to be carried by infantry and used in theatre without need for specific infrastructure, whilst the low-tech and simple design reduces the required training needed for use. Materials used include composites, plastics and polystyrene.

A number of this class are hand-launched, such as the *Desert Hawk*, with a joint system of six platforms and ground station costing around $300k. These are generally used for base surveillance, patrol and convoy monitoring, and target tracking by the 32nd Royal Artillery Regiment within the British Army.

Tactical RPAS

Tactical RPAS are a larger class, with 20m wingspans and masses of up to 2 tonnes common. The larger size allows for a greater range of payload to be carried. Roles carried out by this class include:

- C4ISR—U-TacS Watchkeeper WK450.
- Surveillance—Boeing Insitu ScanEagle.
- Targeting and attack—General Atomics MQ-1 Predator.

Surveillance RPAS carry medium-quality imaging and transmission systems as the primary payload, feeding into military intelligence and operational units live feeds of a battlefield or other targeted area. Ranges for these units can be up to 20 hours dependent on weight, power source and propulsion system.

C4ISR RPAS undertake the tasks previously provided by manned aircraft such as the *Nimrod*. *Watchkeeper* will act as an all-round area transmission unit for the British Army, providing amongst other abilities communication, intelligence-gathering and reconnaissance.

Targeting and attack RPAS are able to acquire and strike selected targets as directed by a ground-based team. Current systems run by the UK require a man-in-the-loop for any firings, following a similar legal process to a manned air strike using a Pavia *Tornado GR4*. Currently forces use the *Hellfire* ground-to-air missile or *GRU-12 Paveway II* 500lb bomb for use with the *Predator* system, with an investigation into the use of the MBDA *Brimstone* missile also underway. Other options in the form of the Israeli *Spike*, believed to be used on the *Heron* platform by the Israeli Defence Force, also exist.

Ground stations for Tactical RPAS will include control points, processing units for incoming data from active RPAS and stations for use by intelligence units. This will allow live mission data to be processed by ground crews and used to update the RPAS' own progress. This requires an active datalink between the RPAS and ground station, provided for the US by the SATCOM satellite array. As the *Reaper* is a US-produced RPAS all transmissions currently pass through US-controlled datalinks.

Strategic RPAS

Strategic RPAS are the largest class of current unmanned systems, having wingspans analogous with manned aircraft and able to carry large payloads. The *RQ-4 Global Hawk* is one example, having a wingspan of 39.9m and a gross mass of 14.6 tonnes. The design is primarily for use in battlefield reconnaissance, undertaking roles previously filled by manned aircraft such as *SR-71 Blackbird*. The large airframe and more powerful turbofan engines allow for a much greater payload to be carried, including high-powered surveillance systems able to work in numerous spectrums and high-quality video feeds.

A prime example of this class is the *Global Hawk*. The unit cost of $174 million is comparable with almost any manned aircraft, reflecting the expanded capability gained through its size and payload. However, through-life costs and those involving training and staff are much lower, leaving the economics of large-scale RPAS affordable in the long-term.

UCAV

UCAV RPAS represent a future ground strike capability using increased stealth technologies. Whilst the strike role is currently carried out by Tactical RPAS such as the *Predator* the future UCAV units, such as the BAE Systems *Taranis* and the Northrup Grumman *X-47B* will include the ability to strike at long distance without the need for refuelling. At the current time plans for engagements using this class would require a large part of the mission to be carried out autonomously, a break from the current practice of man-in-the-loop missions undertaken by users such as the RAF. Outside of take-off and landing mission computers would use pre-inputted co-ordinates, mission data and artificial intelligence to fulfil the main mission objectives.

Expected unit costs for the *Taranis* currently stand at £143 million for the prototype, similar to an F-35, though once technological issues are solved and manufacturing techniques are developed this would be expected to drop significantly.

Swarm RPAS

A future capability in development is the unmanned swarm. This technique requires a high level of autonomy and advanced processing power to allow for the hive artificial intelligence required for the swarm to function correctly. Early efforts in this field have required the use of a man-in-the-loop for safety reasons. The benefits of RPAS swarms include the ability for a large number of smaller units being able to scan larger areas, a lower cost than single larger RPAS models, and extra system redundancy. Current challenges to swarms include multiple access attempts to ground station datalinks and bandwidth availability for communication.

Recent examples of tests in this area include Boeing's use of two *ScanEagles* as part of a group with a Procerus Technologies *Unicorn*. The three RPAS were able to scan a defined area and communicate data to each other with minimal input from the manned ground station.

PRODUCERS AND OPERATORS

Producers

The majority of military RPAS are produced by either the US or Israel. Companies such as Northrop Grumman (US) and IAI (Israel) dominate the international market. The primary producers of RPAS are with examples are:

- Northrup Grumman, US (*Global Hawk*).
- General Atomics, US.
- Israeli Aircraft Industries, Israel.
- Insitu, US.
- Elbit, Israel.
- EADS, Europe.
- BAE Systems, UK.

Countries such as Turkey (ANKA) and the UAE have also developed a number of RPAS.

Operators

The US is currently the world's largest operator of RPAS. The units currently in active service with the US Air Force include:

- General Atomics *MQ-1 Predator* (Armed or unarmed).
- Northrup Grumman *RQ-4 Global Hawk* (Unarmed).
- General Atomics *MQ-9 Reaper* (Armed or unarmed).
- AeroVironment *RQ-11 Raven* (Unarmed).
- Lockheed Martin *RQ-170 Sentinel* (Unarmed).

Aside from the USAF, large numbers of RPAS are operated by other US services. The US Navy, Army, Border Agency, Coast Guard and CIA also operate fleets, totalling a larger number than in USAF service.

The UK is also amongst the lead users of RPAS in active duty. At the current time control of UK assets is shared between the RAF and Army. The British fleet consists of:

- 10 *Reaper*, RAF No. 13 Squadron, used in armed strikes (four in service, five to be delivered next year and one in maintenance).
- 54 Thales *Watchkeeper*, expected to enter service in 2014, 32nd Royal Artillery Regiment, British Army.
- 9 Elbit *Hermes 450*, 32nd Royal Artillery Regiment, British Army.
- Desert Hawk, various British Army infantry units.
- *Black Hornet Nano*, various British Army infantry units.
- *ScanEagle*, confirmed to enter service with the Royal Navy later this decade.

Israel is another nation with an armed RPAS capability. Like the US Israel derives most of its military RPAS from an indigenous industrial base. In addition to the following the Elbit *Hermes 900* is currently in development as a reconnaissance unit:

- IAI *Eitan*, MALE Tactical RPAS, Israel Air Force.
- IAI *Heron*, MALE Tactical RPAS, Israel Air Force.
- Elbit *Hermes 450*, Tactical RPAS, Israel Air Force.
- BlueBird *SpyLite*, Miniature RPAS, Israel Air Force.

France is currently expanding its own unmanned capabilities, driven by the experiences of Mali and Libya. The fleet consists of:

- EADS *Harfangs*, developed from the IAI *Heron.*

The DGA also plans to place an order for 16 *Predator* RPAS for unarmed surveillance and reconnaissance use and has conducted joint trials of *Watchkeeper* with the British Army.

Italy is one of the other few countries in the world with a confirmed armed unmanned capability. The Italian RPAS fleet includes:

- MQ-1 Predator.
- MQ-9 Reaper.

Most NATO nations operating under ISAF have invested in RPAS—Germany and Canada for example—as they proved an effective means to provide over the wall/horizon surveillance and force protection against IEDs. Other countries such as Russia, Iran and China also have unmanned capabilities, covering many of the categories listed previously. However, a lack of concrete information means it is difficult to provide a detailed analysis at the current time.

Current Usage and Ethical Issues

Military Issues

The primary ethical argument surrounding military RPAS has centred on the dislocation of the pilot from the platform, particularly when the platform is operated via SATCOM from a location well away from the theatre of operation. Many people struggle to reconcile the fact that the operator can deliver lethal effect without any risk of coming under attack. There is also deep concern about UCAV systems under development that could potentially autonomously select and strike targets, although there is no appetite within the military at present for humans to be completely removed from the targeting chain.

Public concern over the use of remotely piloted air systems has been aggravated by the deployment of RPAS in non-combat areas as a means of targeting and striking suspected and known terrorists as designated by authorities in the US and others. The primary user of RPAS in this way has been the CIA, with the countries most targeted being Pakistan, Yemen, Somalia and other non-frontline states. Much of the controversy here is raised from the lack of a state of war between the US and the states targeted and public disagreement in some cases as to whether the host nation had given permission for the US to operate in sovereign airspace. Furthermore, the issue of a non-military body having control of an armed capability, as seen by the CIA use of RPAS, also calls into question the role of intelligence agencies and the level of scrutiny and control government can exert over them.

Concern over the control of armed RPAS and the targeting sequences employed, in some cases by air crew with no prior flying experience, has increased. While air forces recruit their RPAS operators from pilots who already have flying experience on manned aircraft, this is not the case with land forces and some border agencies employ contractors to operate the RPAS for them. This has led to concerns that RPAS pilots are not sufficiently "air minded" ie qualified to operate within the air space and this has brought training under scrutiny. Forces such as the RAF have instituted command chains for firings to a level in excess of those used for manned missions. The required presence of legal representatives means the decision for firings is never solely

based on the recommendations of the present commanding officer, but on the advice of the forces own legal position.

Safety and reliability in RPAS are a cause for concern. The case of the US Army-developed *Gray Eagle* showed a large difference between design requirements and operational standards: a system failure was occurring every 25 hours of flight rather than every 100 hours, whilst ground control stations were failing every 37 hours rather than 150. The extent to which human error causes failures has also been shown, with 60.2% of US armed force mishaps caused by the man-in-the-loop. The training of operators and command structures were also the cause of a British *Hermes* crash in Afghanistan in 2010. The report that followed pointed to a lack of airmanship and understanding of flying within the Army command structure, even in RPAS-equipped units. A lack of intermediate training between tours for type rating maintenance was also highlighted.

Civil Issues

The use of RPAS in the civilian and corporate environment has to this point been for surveillance purposes (forest fires, oil spills, farm land) and exploration, specifically for potential oil and gas reserves in remote areas. Recent examples include the US and Canada of governments granting licences for use of unmanned vehicles within the Arctic Circle and currently uninhabited airspace.

Within the UK civilian deployment of RPAS has been severely limited by the regulations enforced by the Civil Aviation Authority (CAA) owing to heavy use of UK airspace by civilian operators (principally commercial airliners). Existing legislation, which is being used as a stop-gap until a better system is constructed, allows for only line-of-sight flight within a pre-arranged segregated airspace and away from any built-up areas. The UK has a programme, ASTRAEA, which is working to help develop some of the enabling technologies and at the same time provide a suitable regulatory framework. The issues of co-operation between nations, especially in the future joint airspace environment of Europe, has led to the proliferation of national rule sets. Efforts are still ongoing to design RPAS requirements into the future *Single European Sky* system to be implemented by EUROCONTROL.

Further Details

In addition to the evidence provided above, the following papers are also submitted:

Quintana, Elizabeth, *The Ethics and Legal Implications of Military Unmanned Vehicles*, Occasional Paper, RUSI, 2008–09

Quintana, Elizabeth, *Manning the Unmanned*, RUSI Newsbrief, RUSI, 2013

Elizabeth Quintana and *Sean Nolan*

13 September 2013

Written evidence from The Baptist Union of Great Britain, The Methodist Church and The United Reformed Church

1. Introduction

1.1 *Who we are*

The Baptist Union of Great Britain, the Methodist Church and the United Reformed Church (URC) comprise three of the largest Free Church denominations in the UK. Our denominations represent around half a million Christians in the United Kingdom. Historically our churches and church members have been keenly engaged in research, reflection and debate on ethical issues associated with military intervention, defence posture and developments in armaments. In 2006 the Methodist Church and United Reformed Church published *Peacemaking: A Christian Vocation* updating our reflection on the ethics of military intervention.

In 2011 we undertook an ethical examination of armed Unmanned Aerial Systems (UAS). The resulting report *Drones: Ethical Dilemmas in the Application of Military Force*[1] was published and debated in the central bodies of our churches and in numerous local and regional church meetings. Our denominations' policy work in this area is facilitated by the Joint Public Issues Team. We welcome this inquiry and appreciate the opportunity to contribute.

1.2 *A brief summary of our approach towards consideration of Unmanned Aerial Systems*

> *"Our approach has been to engage with the reality that armed UAS are here to stay while remaining committed to biblical teaching that 'Peacemaking is at the heart of the teaching of Jesus, not an optional extra'. The tension that this creates is not easily overcome."*
> Drones: Ethical Dilemmas in the Application of Military Force

[1] www.methodist.org.uk/downloads/conf2012-pc-16-drones.doc

We acknowledge the expectation of the UK and other governments that UAS will occupy an increasingly important role in the defence capabilities. The approach of our Churches has been to offer an ethical critique within the context of this reality. Such acknowledgement does not seek to deny the overriding concern of some of our members that by removing from the battlefield those who are responsible for firing weapons at enemy combatants, we cross a line in the way in which wars are fought. They might argue that this development should be resisted altogether.

There are several areas of ethical concern explored in the Churches' joint report. The following concerns feature in the report's conclusion:

— The relative political ease with which these systems can be deployed and concern that this could encourage the use of violence in response to crisis and conflict.

— The capacity offered by the technology for targeted killings.

— The covert nature of UAS and concerns over lack of public accountability for its use.

2. Lessons Learned from Afghanistan—The Need for Clarity Regarding the Roles of UAS

> *"Methodist Conference requests the UK Government to publish as much information as possible concerning current strategy and effect of UAS strikes alongside future plans for armed UAS development and use, and to provide greater clarity on the role that armed UAS play in current military strategy, with particular reference to counter-insurgency".*
> 2012 Methodist Conference Resolution 16/2

When considering the ethics of a new form of armament, crucial questions to ask are "what does it offer" and "how will it be used"? We understand in general terms the various roles that armed UAS might play in the context of NATO's evolving counter-insurgency strategy. This strategy was developed substantially in Iraq and concentrates on gathering human intelligence to understand the nature of the complex network of groups that may be opposed to the aims of security and stabilisation.[2] If groups can be reconciled to the cause of security this is preferable. Otherwise the strategy proposes that armed groups and their members will be removed from battlefield by whatever means is feasible. Clearly the Ministry of Defence perceives UAS to have an important role in improving ISTAR[3] capability to complement human intelligence gathered on belligerent groups. Whether armed UAS might also be perceived to have a role in disrupting networks by removing members of armed groups from the battlefield is less clear.

The ethics of the use of UAS become more challenging once the systems are equipped with missiles and it is armed UAS that have been the focus of our attention. We recognise that UAS have performed a number of specific combat roles in Afghanistan. These include the provision of close air support for troops, convoy protection, monitoring and countering IED[4] activities and the monitoring and elimination of key individuals within insurgent organisations (sometimes described as high value targets). Due to the secrecy surrounding the role of UAS in Afghanistan we have been unable to discern the relative importance of each of these combat roles and hope that this investigation might shed some light on this area. Afghanistan provides an opportunity to assess the relative importance of the roles that UAS might perform and to evaluate their benefits and drawbacks in a situation where it is important to win hearts and minds. The central bodies of our Churches urge greater clarity from the UK government on the role that armed UAS play in current military strategy.

3. Killing of Known Individuals by UAS in Afghanistan

> *"Methodist Conference and URC General Assembly have asked for an affirmation from the UK Government that known individuals are not targeted by air strikes unless such persons are directly engaged in hostilities at the time. We wonder if you might be able to offer a perspective on this question."*[5]
> Letter from Revd Roberta Rominger, General Secretary, the URC, and Revd Dr Martyn Atkins, General Secretary, the Methodist Church in Britain, to the Rt Hon Mr P Hammond, Secretary of State for Defence, dated 25 July 2012.

3.1 *The evidence for targeted killing in Afghanistan*

It would appear that the UK Government's UAS operating in Afghanistan are involved in the targeting and killing of known individuals, possibly when they are located in territory that is too dangerous for ground troops to venture. Such actions would appear to fit the commonly accepted definition of a targeted killing and are a cause of significant concern for us. We provide three accounts in Appendix A drawn from the published RAF Operational Updates from Afghanistan. These Operational Updates have since been discontinued and past issues from which these accounts are taken are no longer available through the Ministry of Defence website. However we have retained copies.

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[2] The strategy is described in the Ministry of Defence Joint Doctrine Publication 3–40 Security and Stabilisation: The Military Contribution

[3] ISTAR; Intelligence, Surveillance, Target Acquisition and Reconnaissance

[4] IED: Improvised Explosive Device

[5] In response the Ministry of Defence reiterated the established position, namely that the Ministry of Defence does not disclose the specific circumstances in which insurgents have been or would be targeted with RPAS.

In each of the three accounts we can note common features:

- The UAS crew were tasked to locate and follow a known individual.
- The individual was assigned to the UAS crew because of who they are, and not because of any military activity in which they were engaged at the time.
- The individual was tracked over an extended period of time (of up to seven hours in one case).
- The individuals did not appear to be involved in any combat operations over the period during which they were tracked. (It is the practice of the RAF bulletins to include a report of such activity and indeed to report the presence of armaments). Whether the individuals were armed is not clear.
- The timing of the strikes on these individuals was determined by their proximity to other persons or to infrastructure and not due to the imminence of any attack or immediate threat that they posed. In the case in which there were concerns about collateral damage to a compound, the Reaper crew "elected to wait for a more suitable time to attack".

3.2 *Rules of Engagement*

These accounts illustrate the capacity for UAS to provide extended surveillance. While jets or helicopters also provide aerial reconnaissance, we suspect that an extended track and kill operation of a seven hour duration is only practical with UAS. We conclude that UAS offer a unique capability in this respect. The Ministry of Defence has stated that missions undertaken by UAS are subject to the same Rules of Engagement as other forms of air power. We wonder whether this statement underplays the ethical considerations around a step change in capabilities offered by UAS today; capabilities that in practice are not matched by other forms of air power.

We note too that in recent years UK ground troops operating in Afghanistan have been required to draw the fire of the enemy before engaging them and that this has on occasions entailed considerable risk on the part of our troops. These Rules of Engagement ensure beyond doubt that, at this point in time, those carrying weapons have lost their status as "civilians not participating in hostilities".

The targeting of known individuals described in the RAF Operational Updates from Afghanistan suggests a quite different application of Rules of Engagement. It would appear that certainty concerning the status of the targeted individuals has been assured. Consequently, not only is it considered to be unnecessary to see the individual fire first, but it appears that it is not necessary for the individual to be directly engaged in hostilities at the time. We would like to understand better how a comparable level of confidence of hostile intent has been achieved and what level of evidence is required.

3.3 *Legal considerations around targeted killing*

There has been much academic and other comment on the vexed issue of combatant and non-combatant status in Afghanistan. In a non-international armed conflict, International Humanitarian Law (IHL) permits direct attacks against members of the armed forces but what constitutes "the armed forces" is in a civil conflict is not resolved by conventional humanitarian law, state practice or international jurisprudence.[6] Civilians are afforded protection from attack under IHL. It is clear that civilians lose the protection afforded to them under IHL while they are "directly participating in hostilities".

However there is an argument for a category for persons who may not be members of an armed force under the conventional definition but "whose continuous function it is to take a direct part in hostilities".[7] In February 2009, ICRC adopted Interpretive Guidance on the Notion of Direct Participation in Hostilities Under International Humanitarian Law.[7] The interpretive guidance proposes that those who are considered to be continually engaged in a combatant function cease to be civilians for as long as they remain members of the organized armed group. We acknowledge that this interpretive guidance is itself contested and debated by international law experts and others; some are concerned that it offers too much latitude while others argue that its strictures are too narrow.

In correspondence with us on this question the Ministry of Defence has stated that in accordance with IHL and UK Rules of Engagement "only legitimate *military* objectives will be targeted". It would be helpful to know whether this is a reference to the application of "continued combatant status" (rather than civilian status) in the case of UAS strikes against known individuals who are not directly engaged in hostilities at the time. If individuals are not directly engaged in hostilities at the time what determines "hostile intent" of these individuals. What level of risk do they have to present for the Ministry of Defence to justify the exceptional measure of targeting with missiles?

Clarification on this question would be valuable as there is an urgent requirement for universal agreement on the application of international law to counter-terrorism and counter-insurgency operations.[8] An

[6] *Targeting Operations with Drone Technology: Humanitarian Law Implications* (Background Note for the American Society of International Law Annual Meeting Human Rights Institute, Columbia Law School, March 2011) Part II Who may be targeted? Page 21

[7] http://www.icrc.org/eng/assets/files/other/irrc-872-reports-documents.pdf

[8] *Drones: Ethical Dilemmas in the Application of Military Force*: Section 4. "Terrorism and International Law"

understanding of the UK practice in application of IHL could offer a helpful contribution to discussion and debate around these important principles. Even though these actions are taking place in the context of an armed insurgency our Churches nevertheless remain unsettled by the killing of known individuals who are not at the time directly participating in hostilities at the time. The situation is made even more difficult by the lack of accountability for these actions.

4. Constraints on the use of UAS

4.1 *The use of armed UAS and targeted killing in Counter-Terrorism*

> *"Terrorists function outside the law. It is vitally important that the UK and its allies do not do so too".*
> Drones: Ethical Dilemmas in the Application of Military Force

The US Administration's use of drones and explosive weapons in Northern Pakistan is disturbing both in its extent and in its disregard for established international norms. In correspondence with our Churches, the Ministry of Defence has affirmed the UK's declaration that "Armed Conflict" does not include situations which are constituted by the commission of ordinary crimes including acts of terrorism whether concerted or in isolation. This declaration, attached to the UK ratification of Addition Protocol I to the Geneva Conventions 28 Jan 1998, remains in force.[9]

The US administration takes a very different legal view while admitting that the laws of war require "translation" in order to be applied in the context of counter-terrorism.[10] However, no government possesses the freedom to unilaterally re-interpret customary international law. It is particularly problematic to attempt to unilaterally re-define the principle around the grounds for recourse to military intervention which is so fundamental to international peace and stability. To do so in this manner risks undermining international order, potentially allowing any regime that might be inclined to act militarily beyond their jurisdiction to claim to be doing so under the guise of international humanitarian law.

In our report our Churches have stressed that international law has normative content that remains important in safeguarding the international community from descent into arbitrariness and the uncontrolled use of brute force. The targeted killing of named individuals in response to terrorism is a form of lawlessness that imperils us all. It is in our national security interests to uphold the basic accepted norms in international law. As the UN General Assembly considers the report of Ben Emmerson, Special Rapporteur on Counter-Terrorism and Human Rights, we urge the UK government to work to ensure cohesion in approach among our international partners and establish policy on counter-terrorism based on the accepted norms in international law.

4.2 *Trauma caused by the use of explosive weapons in populated areas*

> *"Anyone who has witnessed an act of terrorism or met those injured and the families of those killed will appreciate that the mental trauma can remain long after physical scars have healed. Of course trauma is not exclusive to terrorist attacks but may be experienced anywhere where explosive weapons are used in civilian areas."*
> Correspondence from the Baptist Union, Methodist Church and United Reformed Church to the Foreign and Commonwealth Office, 5 October 2012

In Afghanistan the vast majority of civilian deaths and injuries (74% of the total civilian deaths recorded by UNAMA[11] between January and June 2013) are caused by anti-government agents rather than pro-government forces. These deaths primarily involve the indiscriminate use of IEDs, and suicide and/or complex attacks in areas populated or frequented by civilians, including civilian Government offices. The deliberate targeting of civilians by the Taliban and other armed groups opposed to the Government, is designed to intimidate and create fear among the civilian population and those working on behalf of the government.

In the very different context of Northern Pakistan communities suffer stress and trauma arising from regular surveillance operations carried out by armed UAS especially when combined with occasional or regular lethal strikes. According to the study undertaken by Stanford/NYU and the resulting report Living Under Drones,[12] US drone strike policies cause considerable and under-accounted for harm to the daily lives of ordinary civilians, beyond death and physical injury. Residents have to face the constant worry that a deadly strike may be fired at any moment yet they are powerless to protect themselves. The presence of drones has terrorized men, women, and children, giving rise to anxiety and psychological trauma among civilian communities.

Too frequently the discussion around impact on civilians focuses primarily on civilian deaths. We would appreciate recognition by the Ministry of Defence that the use of explosive weapons in populated areas is generally unacceptable due to the trauma caused by such weapons. The use of Hellfire missiles in civilian areas

[9] The Ministry of Defence further noted that this statement was made specifically in relation to the material scope of Additional Protocol I which covers the protection of victims in International Armed Conflicts.

[10] Harold Koh, Legal Adviser of the U.S. Department of State; (Speech given to the Annual Meeting of the American Society of International Law in Washington, DC, March 25, 2010); http://www.cfr.org/international-law/legal-adviser-kohs-speech-obama-administration-international-law-march-2010/p22300

[11] UNAMA; United Nations Assistance Mission in Afghanistan

[12] www.livingunderdrones.org

is sometimes defended on the basis that the missiles are usually accurate and the blast area relatively well-defined and that therefore the injury to civilians can be predicted.[13] This defence fails to recognise the wider trauma caused by explosive weapons on men, women and children in a community.

Monitoring Explosive Violence (2011)[14] produced by Action on Armed Violence (formerly Landmine Action) draws attention to the impact of the use of all types of explosive weapons in populated areas. The intention of this work is to help to bring to the forefront of public consciousness the human impact of explosive weapons and their high cost when used in civilian areas. The UN Secretary General has urged more systematic data collection on the human cost of the use of such weapons in civilian areas and welcomed this project. Our Churches have invited the Foreign Secretary to endorse and support this work.

5. Tomorrow's Potential

5.1 *Increasing automation*

The further development of UAS technology is likely to see increasing automation. The area that has concerned us most is the potential for further automation in target identification and weapons firing. The UK Government has stated that it would retain a human in the loop. However as systems become more automated the crucial question is how the human in the loop perceives and executes their role. With an increasing amount of data available might the operators become swamped? If data gathering becomes more systematised with more people involved in the "kill-chain" does the scope for individual questioning, for example concerning the evidence that a person or object is a legitimate military target, reduce? These are questions that at this stage we raise as matters for further study, aware that they are also being asked elsewhere.

5.2 *Autonomous weapons systems*

> *"General Assembly urges the UK government to begin to explore ways in which the international community might implement an arms control regime to reduce the threat posed by the development of systems capable of autonomous targeting and weapons delivery."*
> The United Reformed Church General Assembly 2012—Resolution 29

Our churches argue that the autonomous firing of weapons represent an ethical red line that should not be crossed. While successive UK Government defence ministers have stated that the UK has no plans to remove the human from the loop it is not entirely clear whether this is based on an ethical objection or on a lack of trust in the technology currently available to carry out target identification with reliability.

The Rt Hon Alistair Burt MP, Foreign Office Minister, has reiterated the UK Government's position[15] that it has no intention to engage in the development of fully autonomous weapons. This is welcome. We believe that the Government should follow up this position with support for an international moratorium on the development and use of such weapons. Mr Burt has explained the Government's reluctance to support such a moratorium is based on its belief that the Geneva conventions and additional protocols provide a sufficiently robust framework to regulate the development and use of these weapon systems. He states that the government believes that the existing rules of international law should prevent the development of these systems.[16]

Yet existing rules do not prohibit the development of such weapons. This is acknowledged by the Ministry of Defence Joint Doctrine Note 2/11 that states that as long as certain criteria are satisfied these autonomous weapons would be "entirely legal".[17] If the UK Government considers the development of autonomous weapons systems to be incompatible with international humanitarian law it should support the negotiation of an international instrument that makes this explicit.

6. Transparency and Accountability

> *Greater openness and accountability on the part of military forces would help to clear some of the fog that surrounds the systems and their use. We have noted the recommendation that prompt and public release of ISAF investigations into incidents involving civilian casualties from all air strikes (by manned or unmanned aircraft) would improve relations with affected Afghan civilians and communities.*[18]
> Drones: Ethical Dilemmas in the Application of Military Force

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[13] See for example MoD, Counter Terrorism Department, response dated 29 November 2012 to the Baptist Union of Great Britain, the Methodist Church and United Reformed Church

[14] "*Monitoring Explosive Violence: The EVMP Dataset 2001"* Published by Action on Armed Violence, March 2012, www.aoav.org.uk

[15] During the Commons debate of 17 June 2013 on Lethal Autonomous Robotics http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm130617/debtext/130617–0004.htm#130617–0004.htm_spmin0

[16] Alistair Burt, House of Commons, 17 June 2013 "*As I had the chance to read the hon. Lady's speech before the debate, I noticed that she used the phrase 'Furthermore, robots may never be able to meet the requirements of international humanitarian law'. She is absolutely correct; they will not. We cannot develop systems that would breach international humanitarian law, which is why we are not engaged in the development of such systems and why we believe that the existing systems of international law should prevent their development*."

[17] On the subject of an attack carried out by UAS without reference to higher human authority the Doctrine Note 2/11 states: "*Provided it could be shown that the controlling system appropriately assessed the LOAC principles (military necessity; humanity; distinction and proportionality) and that ROE were satisfied, this would be entirely legal*."
Joint Doctrine Note 2/11 The UK approach to Unmanned Aircraft Systems, March 2011

[18] Afghanistan, *2011 Civilian Causalities Report* (UNAMA, Kabul, Feb 2012)

6.1 *Transparency and accountability in Afghanistan*

The use of remote weaponry further distances fighting forces from communities impacted by conflict. In the context of an insurgency such as Afghanistan where winning hearts and minds is vital, this perception of remoteness through the use of drones can be mitigated through accountability and transparency concerning drone operations. In Afghanistan air strikes represent the largest single cause of civilian death from pro-Government forces representing 38% of all such civilian deaths. UNAMA monitor and investigate deaths from the conflict in Afghanistan and in the case of some airstrikes are unable to ascertain what type of aircraft (fast jet, helicopter or UAS) has released missiles. ISAF forces claim to investigate all allegations of civilian deaths resulting from their actions but decline to release reports of their investigations. UNAMA argue that prompt and public release of investigation findings would promote transparency, accountability and better relations with affected Afghan civilians and communities.

6.2 *Transparency and debate in the UK*

> *"Greater transparency would also help to resource public understanding and debate. Without public trust and accountability fears may increase that rather than being masters of technology, the technology may come to master us".*
> Drones: Ethical Dilemmas in the Application of Military Force (Section 9)

We are grateful to a few individuals within the Ministry of Defence who have helped us understand better the issues surround the development and use of UAS. They have acknowledged that the ethical challenges are real and that public awareness and informed debate is necessary. However our sense is that this commitment to public discussion is not shared more widely within the Ministry and inevitably discussion around the use of UAS is too quickly constrained by the perceived need to maintain confidentiality.

We fully appreciate that the Ministry of Defence must ensure that they do not place in the public domain information that could be of advantage to belligerent groups intent on attacking our forces. However we invite the Ministry of Defence to consider whether there is a means for discussing general principles and policies around targeting and other issues in such a way that would not compromise operational security.

Some of the fears that have arisen over the UK's use of UAS could be allayed by an improved communication strategy on the part of the Ministry of Defence. The care taken by the UK in the force's use of UAS is quite distinct from that of the CIA's operations in north-western Pakistan, yet this is not always obvious given the lack of information on current UAS operations in Afghanistan.

7. Recommendations

In summary our recommendations for the Ministry of Defence and/or Foreign and Commonwealth Office are as follows:

(i) Ensure that Rules of Engagement no longer permit UAS to track and kill known individuals who are not directly involved in hostile action at the time. (3.)

(ii) Publish the findings of investigations into allegations of civilian deaths from airstrikes in Afghanistan to enhance relations with affected Afghan communities. (6.1)

(iii) Seek to improve the public consciousness in the UK and elsewhere of the human impact of explosive weapons and their high cost when used in civilian areas and consider endorsing the Monitoring Explosive Violence project. (4.2)

(iv) Work with the US Government and other international allies to ensure consistent approaches to counter-terrorism based on established norms in International Humanitarian Law. Reiterate the long-established UK position that the Laws of Armed Conflict cannot be used to justify military intervention to counter terrorism. (4.1)

(v) Promote dialogue on the parameters used to determine the legal status of combatants and the implications for Rules of Engagement in counter-insurgency situations. (3.3)

(vi) Provide greater clarity on the role that armed unmanned aerial systems play in current military strategy. (2.)

(vii) Support the call by a number of Governments for a moratorium on the development of autonomous robotic weaponry and assess the feasibility of a new international instrument to prohibit the use of such weapons. (5.2)

Steve Hucklesby
Policy Officer

27 September 2013

APPENDIX A

RAF OPERATIONAL UPDATES

AFGHANISTAN

4 August 2012—During one of these missions, the Reaper was tasked with searching for a known insurgent riding a motorcycle. Having identified the insurgent, the crew were given authority to attack but elected not to do so as they had observed him entering a Bazaar. The Reaper crew followed this individual for a further 7 hours before carrying out a successful attack.

28 July 2012—This week they delivered over 280 hours of full motion video (FMV) which is used extensively by ground troops of the UK Task Force Helmand and the US Marine Corps of Task Force Leatherneck. During one of these missions, the Reaper was tasked with tracking an insurgent on a motorcycle. The Reaper crew followed this individual for some time until he parked his motorcycle by a compound and walked into an adjacent field. Although legally authorised to attack, the crew decided that he was still too close to the compound for them to be absolutely sure that there was no risk of damage to the compound and elected to wait for a more suitable time to attack.

3 April 2012—On one mission this week, the Reaper was tasked with tracking a known insurgent travelling on a motorbike in the region of Lashkar Gah. Over the course of 5 hours the Reaper tracked the insurgent and it was only once there was no risk to civilians that the aircraft was authorised to carry out a successful strike.

Source:

These are extracts from Operational Updates that were published on a weekly basis and made available online. The Updates have since been discontinued and past issues from which these accounts are taken are no longer on the RAF website. Copies of the above three issues are available from the Joint Public Issues Team.

Written evidence from Thales UK

BACKGROUND

Thales is a global technology leader in the Aerospace, Transportation and Defence & Security markets. In 2012, the company generated revenues of €14.2 billion (equivalent to £11.5 billion) with 65,000 employees in 56 countries. With its 25,000 engineers and researchers, Thales has a unique capability to design, develop and deploy equipment, systems and services that meet the most complex security requirements. Thales has an exceptional international footprint, with operations around the world working with customers and local partners.

Thales UK employs 7,500 staff based at 35 locations throughout the country. In 2012 Thales UK's revenues were around £1.3 billion.

KEY POINTS

— The clear benefits of Unmanned Aircraft Systems (UAS) to military capability across land, sea and air mean that their development and operation will be a growing part of the force mix for the foreseeable future. Their use not only spans the three environments but has already evolved at this early stage from instruments providing tactical advantage to pivotal strategic assets.

— UAS are a disruptive technology that give disproportionate competitive and operational advantages to "early adopters" (in this case, nations) during the initial stages of their active life.

— The UK's current industrial position in UAS is built on core research and development over the last two decades. It is subject to erosion by both other nations and exploitation by civilian users. Maintaining the UK's relative strength in UAS into the future depends on continued investment and innovation.

— The range and capabilities of sensor payloads are the key determinant of reconnaissance UAS effectiveness. To maintain and strengthen the UK's relative position in UAS, development of key sensor and information exploitation elements is of primary importance.

INTRODUCTION

UAS are perhaps the defining, and certainly the most iconic, military technology of the 21st Century so far. Just as in previous eras, the rapid adoption and exploitation of a disruptive technology has, over the last decade, created both opportunities and challenges for the military and industry alike. Thales welcomes the Committee's inquiry as a timely means to ensure wider understanding keeps pace with this fast growing capability.

As the Committee will no doubt note, for the UK's military the adoption of UAS has significantly enhanced our national ability to deliver timely critical Intelligence, Surveillance and Reconnaissance outputs; thereby reducing risk to service personnel. Even at this early stage it is clear that the operational benefits UAS can bring to military capability across land, sea and air are sufficiently attractive to ensure the use and development of UAS will be part of the force mix for the foreseeable future.

This submission does not seek to give a view on the military aspects of the Committee's enquiry, which are properly dealt with elsewhere, but to offer an industrial perspective based on Thales' position as a global leader in the development of UAS. In the UK, Thales' activities in this area include the provision of over 85,000 flying hours of UAS support to British troops in Afghanistan, via the Hermes 450 "ISTAR by the hour" service contract, and as the supplier of the UK Army's WATCHKEEPER UAS programme which will shortly be accepted into service. Thales is also one of the leading industry players in the ASTREA consortium, tasked with developing the future regulatory, certification and technology roadmap for use of UAS in non-segregated airspace, with lead responsibility for "Sense and Avoid" in the UK.

This submission gives a brief overview of Thales' views on the main areas the Committee has outlined for discussion. Thales would welcome the opportunity to elaborate further on these points, and other areas of interest, in the course of the Committee's deliberations.

Maintaining the Technological Advantage

UAS are a classic disruptive technology, which give disproportionate competitive advantage tò early adopters' during the initial stages of their active life.

As could be expected owing to their relative technological complexity, the early adopters of UAS have been modern Armed Forces which are active globally, mostly in the West. Their use is not yet widespread amongst second tier and regional players, including potentially less friendly nations—but not for the want of trying. UAS capabilities are amongst the most sought after industrial competences for emerging countries seeking to grow their indigenous defence base, and one of the principle areas where nations of all sizes are investing research and development funds in search of "leapfrog" technologies which effectively counter existing superiorities in military numbers or conventional firepower.

The UK's present capability advantage is therefore welcome and valuable, but vulnerable to erosion over the coming years, without continued development of the high value elements of UAS systems. The industrial advantages domestic companies, like Thales, offer to UK and allied countries are built on core research and development activity undertaken over the last two decades—maintaining the UK's relative advantage into the future depends on investing for success and continuing to innovate in key areas.

Critical Elements of UAS Capability

One major industrial lesson from UK UAS operations thus far has been the relative roles played by the different elements of the system. Whilst the aeronautical elements of the system are amongst its most visible, outside of navigation and sense and avoid technologies it is the quality of sensors and information analysis and exploitation that generate a battle-winning edge. Whether in the context of current operations with relatively uncontested airspace, or in other non-permissive environments less amenable to physical incursion by an air vehicle, the range and capabilities of UAS sensor payloads are the key determinant of how and where it can be used. Likewise the ability to interpret and disseminate the output of sophisticated UAS sensors is the difference between obtaining a mountain of data and actioning effective intelligence.

As this market develops this is likely to continue to be the case given that, owing to the cost and effort required for platform certification and accreditation, much future platform development may be focused on dual-use in both military and civil markets. As a result the primary differentiators between military and civilian non-weaponised applications will be the comparative sophistication of the sensor systems, cryptography and data fusion suites—as is often the case in satellite systems, for example.

As the UK considers how to strengthen its military UAS capabilities relative to other countries, one of the principal areas of focus must, therefore, be the continuing development of the key sensor and information management elements.

UAS as an Economic and Trade Growth Sector

As the economics of defence shift, and national budgets fall behind the cost of development for highly sophisticated new capabilities, international trade and collaboration continue to become more important as a means to make development affordable and attractive. The UAS sector is projected to be one of the major growth areas in the global defence market over the coming decade, and the UK should seek to capture a major share of this business.

The UK's significant experience in UAS operation on allied operations, its existing procurement programmes and suitable relationships with key allies make it an attractive partner for UAS collaboration, and indeed much of the competitive advantage enjoyed by the UK military has been made possible through agreements with key partners including the US and France. In the broader global market, relatively few countries have the global profile, military UAS expertise and experience, industrial competences and proven product offerings, and the familiarity with the reality of major defence export business to successfully approach this market.

The Committee will be familiar with the particular challenges and traits of the defence export market, including the need for significant Government support and strong references in domestic procurement programmes. As in other sectors it is vital that, as plans for future UAS capability move forward in the UK,

both Government and suppliers are alive to the capability and affordability benefits which will be generated if domestic, international cooperation and export activities are aligned and mutually supportive. In addition, the diplomatic and economic benefits generated by a strong "market position" for the UK in this area would be significant.

Awareness and Misconceptions

One currently prevalent misconception arises from the fear that either a lack of human intervention in UAS "decision making" or the remote nature of UAS in some way reduces the quality or gravity of military decision making.

To the former, the periodic confluence of the concepts of "unmanned" and "autonomous" in uninformed media and commentary is the source of constant frustration for those versed in the realities of UAS use. By design, the autonomous elements of UAS systems in use by the UK are those which are required to ensure, for example, safe flight operations with appropriate contingent systems, and never those involved in the deployment of lethal force, which requires without question the involvement of a human operator.

Misconceptions and concerns around UAS compare starkly with high levels of public confidence in the autonomous elements of seemingly more pedestrian areas such as civil aircraft and railway networks, which are nonetheless responsible for the safety of large groups of people. In general neither the military nor industry are incentivised to push for autonomy as an end in itself—rather being incentivised on ensuring the lowest risk possible in the control and use of military technologies.

In common with other long-established decision makers at some remove from the battlefield—for example strategic commanders, air controllers, naval battle group commanders and those leading cruise missile or some air strike missions—UAS operators are held to the same standards and doctrinal principles as any other military personnel. Likewise, these existing roles illustrate that there are benefits arising from the remote use of UAS, not least ensuring decision making is less vulnerable to the intense emotional and psychological pressures of a battlefield and avoiding the risk of "handing off" targets to separate weapons platforms. There is of course also the eminently straightforward benefit of increasing the real-time intelligence available to commanders and key staff (such as legal advisers, targeting and intelligence personnel) who would in any instance be away from the front line.

Comments on Specific Questions

Nomenclature

Thales is content with the terms and definitions as articulated within the Joint Doctrine Note 2/11 "The UK Approach to Unmanned Aircraft Systems". This provides a clear set of guidelines for use in describing unmanned vehicles in any environment; aerial unmanned vehicles are a subset of a much wider group of unmanned vehicles and capabilities, such as submersibles, surface vessels, and land vehicles. Based on this doctrine, the term "UAS" is used throughout this note.

Of particular importance to the discussion on nomenclature is to recognise that the use of phrases such as "drones" and "autonomy" can be highly emotive, often arising from a lack of knowledge as to how human decisions are incorporated within UAS missions. The HCDC's enquiry should seek to ensure that there is greater public understanding as to the role of humans within the operation and conduct of UAS missions.

Current Utility and Dispersal

There has been significant growth in the military use of UAS over the past decade and, more recently, in their use in novel ways by civilian operators.

In Iraq and Afghanistan, UAS have provided an increasingly sophisticated level of ISTAR support to armed forces, as well as tactical strike and tactical lift in non-permissive environments. On the battlefield and more widely, UAS have been used for radio communication nodes and to provide BLOS (Beyond Line Of Sight) communications networks. UAS can also carry payloads which enable remote hyperspectral analysis, including chemical fingerprinting. By comparison, the use of UAS in civil markets is in its infancy, and significant market and structural barriers remain before widespread use of UAS becomes the norm in other sectors. As the cost of ownership of UAS has decreased, early examples of civil application have emerged, including mapping and surveying, agriculture monitoring, poaching prevention, power line survey and environmental damage assessments.

Lessons Learnt from Operations in Afghanistan

Thales are proud to have provided the LYDIAN service to the UK Armed Forces in support of operations in Afghanistan. Thales have maintained and operated in-theatre a fleet of HERMES 450 UAS, delivering over 85,000 hours of service.

From the feedback Thales has received from military users of UAS, it is clear that UAS in an ISTAR capacity are a force multiplier providing intelligence to commanders to allow accurate and timely decisions making for mission objectives and providing ground forces with real time information to limit exposure to

unnecessary risk. Over time, commanders in Afghanistan have become increasingly reliant on the situational awareness provided by UAS ISTAR assets to maximise mission success and minimise casualties. There was a time when patrols in Afghanistan were conducted in relative ignorance of what potential enemy action they might face; now it is unlikely that any ground forces would patrol without an ISTAR asset providing real time intelligence in support.

Tomorrow's potential—What additional capabilities will the UK seek to develop from now until 2020?

UAS technology and capabilities have matured significantly since their first deployment with UK forces in the Balkans (PHOENIX). Much of their use has been shaped by the changing nature of combat, with ill-defined battlefields and dispersed combatants. This has required increasingly agile, adaptable and flexible armed forces requiring detailed, current intelligence and improved battlefield awareness. UAS have been part of this revolution and their future use will continue to be shaped by these changing requirements. The level of incorporation of UAS will only be limited by the rate at which information from them can be collected, collated and delivered in an intelligible fashion to decision makers to enable them to respond intelligently and effectively to changing situations.

In the military space, future developments as well as the move to support contingency operations will involve increased utilisation of UAS in the littoral and maritime environments. This will require the development of suitable radars and navigation suites, engines developed for endurance and BLOS communication suites.

UAS have a significant role to play in ensuring national security, whether for law enforcement or disaster management. Ultimately, this may mean the routine operation of UAS in civilian airspace—in effect "over back gardens"—with the consequent demands on safety and certification, sense and avoid technologies and pilot standards.

Constraints on the use of RPAS in the UK and Overseas

There are primarily two causes of constraint on the operation of UAS, both within the UK and Overseas:

1. *Availability of Airspace*

   Availability to airspace can be limited either because of access issues (in essence the ability to operate outside of military/controlled airspace within a civil environment such as in the UK) or because of the prevailing level of permissiveness (in a military context). In the former, certification and acceptance of the use of UAS in uncontrolled airspace will be key. In the latter, the development of sense and avoid and UAS-specific Defensive Aid Suites will increase survivability. The future government development of UAS air traffic insertion technology and the appropriate engagement with CAA and global civil and military regulators (based on the success of the government supported ASTRAEA programme) is key for UK MOD and homeland security operations of UAS.

2. *Access to Electromagnetic Spectrum*

   A key limiting factor at present in the free operation of UAS globally is the requirement for access to spectrum, both for flight control and data transfer. These additional demands for bandwidth will need to be factored into future military electromagnetic spectrum requirements.

Ethical and Legal Issues arising from the use of RPAS

Like all military actions, the use of UAS should be subject to the same consideration as all military activities under the Law of Armed Conflict, that is no different to the consideration of legality of use given to the use of ground forces or manned aircraft for example.

The primary legal consideration for the future of UAS is the efficacy of the Missile Technology Control Regime (MTCR) in controlling UAS technology, in particular whether the control of UAS technology alongside that of ballistic missile technology remains a credible and manageable method in preventing the proliferation of technologies necessary to produce long range missiles, whilst allowing the legitimate globalisation of UAS capabilities.

18 September 2013

Written evidence from ADS

About ADS

ADS is the trade organisation representing the UK aerospace, defence, security and space industries. Farnborough International Limited (FIL), which runs the Farnborough International Airshow, is a wholly-owned subsidiary. ADS has offices in England, Scotland, Northern Ireland, France and India. ADS comprises over 900 member companies within the industries it represents, of which over 850 are small and medium enterprises (SMEs). Together with its regional partners, ADS represents over 2,600 companies across the UK supply chain.

ADS also supports the Aerospace Growth Partnership, SC21, Sustainable Aviation, Defence Industries Council, RISC and hosts the Aerospace & Defence Knowledge Transfer Network.

Background to the ADS Sectors

- The UK aerospace sector contributes over £23 billion to the UK economy, is the largest aerospace sector in Europe and the second largest globally after the USA. The sector directly employs nearly 100,000 people spending more than 8% of turnover (£2 billion) in R&D in 2010.
- The defence industry employs over 300,000 people in the UK—directly and through the supply chain. The industry invested £1.5 billion of annual sales revenue in R&D in 2011, 7% of annual turnover—amongst the highest in industrial sectors.
- The UK security industry exported £2.6 billion in 2011 in an estimated £62 billion. export market, representing a 4% market share.
- The UK space industry turns over £9 billion each year and is predicted to grow 7.5% each year. Internal R&D funding has risen from 55% (2008–09) to 72% (2010–11) in the more significant upstream sector, which is also more R&D intensive than Aerospace.

Summary

ADS welcomes the Defence Committee's inquiry into this important area of technology. A recent study by the US analysts, Teal Group estimated the worldwide market for Unmanned Aerial Vehicles (UAVs) to be £8.35 billion by 2018. The UK is well positioned to exploit this huge area of growth, particularly through the ASTRAEA programme (Autonomous Systems Technology Related Airborne Evaluation & Assessment), made up of seven leading UK-based companies in the sector.

There are three keys areas to the ADS response to the Committee's inquiry:

1. Current utility and dispersal of Remotely Piloted Air Systems (RPAS):
   - Surveillance—providing an effective mechanism for both military and civilian application.
   - Armed—systems with missiles for the operator to react to a potential threat.
2. Tomorrow's potential:
   - Operational capabilities—technological developments increasing RPAS effectiveness.
   - Increased domestic use—sectors to benefit from the use of RPAS following changes in regulations.
3. Technology and Innovation:
   - Taking a systems based approach to the technology.

1. *Current utility and dispersal*

1.1 Surveillance RPAS

1.1.1 The vast majority of civilian and military RPAS are used for surveillance. Whether controlled from a long-range base thousands of miles away or launched and operated via a handheld monitor, merely hundreds of metres away, the capability to use live feeds from cameras attached to RPAS to monitor the landscape below, is the largest application of remotely piloted technology in both a military and civilian environment.

1.1.2 On military operations, RPAS can be used in situations too dangerous, remote or uncertain for soldiers themselves to enter or to provide live surveillance footage of an area soldiers may be about to enter, reducing the potential threat and providing a greater understanding of the surroundings and situation. The British Army's has, for example, used surveillance RPAS in Afghanistan to check for signs of roadside bombs ahead of convoys.

1.1.3 Domestically, RPAS enable surveillance by the Police and response services at large scale events. In these situations they provide a bird-eye view of the situation that is cheaper and can stay in the air longer than traditional airborne surveillance equipment such as helicopters, allowing their direct deployment to situations as necessary.

1.2 Armed RPAS

1.2.1 Missiles attached to long-range RPAS enable both surveillance of a target and a potential missile strike in an area where a fighter jet or helicopter may not be a viable option. Armed systems make up a small proportion of RPAS used by militaries world-wide. The length of time and variable speed at which they can travel in order to monitor a situation or target, can make them a more effective choice of weapon in certain situations.

2. *Tomorrow's potential*

2.1 Operational Capabilities

2.1.1 Technological improvements in the development of RPAS are likely to see a number of increased operational capabilities in systems for use in both civilian and military environments over the coming decade:

- A greater level of autonomy of systems to reduce the support and control overhead, thereby reducing data flow requirements.
- Greater lift and weight support, enabling the increased use of RPAS in logistics and in autonomous lift in theatre.
- Improved data-links to manage the data flow, enabling a greater level of data to flow back to users.
- Faster data-analytics for the vast amount of sensor information to allow near real time operational knowledge to flow back to decision makers.
- More robust data protection and cyber security of information and communications lines.
- Next generation electric-hybrid power technologies, creating more environmentally friendly systems.
- Miniaturisation of technologies to allow close-quarter use of RPAS.

2.1.2 These capabilities will increase the scope for application of RPAS by the military, as systems become more cost-effective to run and resistant to electronic attack.

2.2 Increased domestic use

2.2.1 The current regulations on RPAS in UK airspace are preventing use to their full potential. The Civil Aviation Authority (CAA) guidelines, CAP-722, on the uses of RPAS, do not as it stands recognise RPAS in the same context as conventional aircraft, and therefore limit their current uses substantially. ASTRAEA is working to understand and agree with the CAA the route to product certification and changes to CAP-722, regarding the safety requirements RPAS must operate under are due to come into effect towards the end of the decade. These reforms have the potential, if implemented effectively, to enable the greater domestic use of RPAS in:

- ***Security***, through the increased use of airborne surveillance systems at events and dangerous situations.
- ***Search and Rescue***; to eventually replace manned services where more efficient.
- Agriculture; the monitoring of crops.
- ***Telecommunications***; creating temporary communications links in emergency situations or at every day events.
- ***Conservation***, to track endangered species and changes to wildlife habitats. Early developments have been made in this area through the use of RPAS to track endangered species in the Gobi Desert.
- ***Energy***; the monitoring of overhead power-lines and Nuclear PowerStation construction.
- ***Construction***; to inform architects and project managers of progress and for the lifting of materials
- ***Logistics***; for movement and delivery.

3. *Technology and Innovation*

3.1 When considering the future uses of RPAS, it is important to consider the technology and its implications at a systems level rather than the end result alone. Historically, technologies developed for the defence and security services have been used in other sectors to improve everyday civilian technology.

3.2 The ASTRAEA programme has developed decision support technology initially intended for the unmanned domain that can be re-introduced back into the manned domain to make pilots even better aware of their situation and flight status. Such technologies will have spin-off potential into other sectors including transport, automotive and health.

Similarly, sensor and communications technology in development for RPAS will have a number of civilian uses that have the potential to greatly improve everyday services, for example in the telecommunications and health sectors. Inclusion in medical equipment, both in and outside the body, is likely to benefit doctors monitoring the real-time health of patients in person, or at a distance.

September 2013

Written evidence from James Earle on behalf of the Association of Military Court Advocates

DRONING FOR BRITAIN

LEGAL AND ETHICAL ISSUES ARISING FROM THE USE OF REMOTELY PILOTED AIR SYSTEMS

THE ASSOCIATION OF MILITARY COURT ADVOCATES (AMCA)

The Association of Military Court Advocates was established in 2005 to aid those who practise military law and represent members of HM Forces at the Military Courts. The aim of the Association is to assist and train practitioners in providing advice and guidance and to take an active interest in the development of military law and the law of armed conflict.

Hon. Chairman: The Rt. Hon. Lord Thomas of Gresford OBE QC (Goldsmiths Chambers)

Hon Treasurer: Mr Richard Hanstock (3 Raymond Buildings)

Hon Secretary: Ms Annelisa Eccles (Review Point Consulting)

Membership Secretary: Mr Matthew Bolt

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Mr Ian Graham (Fraser Dawbarnes)

Mr Ged Hale (Hale Law)

Miss Rhiannon Sadler (Westgate Chambers)

Mr Reuben Scott (Richard Griffiths & Co.)

Mr Julian Young (Julian Young & Co.)

BIOGRAPHICAL NOTE

James Earle was commissioned from RMA Sandhurst into the Royal Regiment of Artillery. He served to the rank of Major in a variety of home and overseas posts before obtaining a Masters degree in War Studies from King's College, London. He is now a barrister specialising in criminal law at Fenners Chambers in Cambridge.

INTRODUCTION

1. This paper is concerned with ethical and legal issues arising from the delivery of lethal force by unmanned air vehicles (UAV/drones). It is submitted on behalf of the Association of Military Court Advocates, which is an organisation of civilian lawyers with a particular interest in military law and the law of armed conflict.

2. The paper provides a summary of technical developments in unmanned aircraft; explains their potential for proliferation; and places them in an ethical and legal context. The conclusion is that UAVs, even when fully autonomous, are neither inherently unethical nor unlawful. However, their legitimate use is contingent upon information disclosure and independent scrutiny.

3. The recommendation of the paper is that consideration should be given to the creation of a standing independent reviewing committee, served by a small secretariat. The committee should be capable of hearing expert military and civilian evidence on technical developments; advising on the ethical and legal implications of UAV deployment; and providing such public information as is consistent with the national interest and security.

TECHNICAL DEVELOPMENTS AND PROLIFERATION

4. Unmanned air vehicles have been a significant feature of all recent military operations, and their success in surveillance and reconnaissance has created a burgeoning civilian market. In December 2011, United States Customs & Border Protection announced the purchase of its ninth drone, a *Predator B*, in Arizona.[19] Apart from tracking illegal immigrants and drug smugglers, drones have been used to support wider Federal law enforcement. Cattle rustlers,[20] kidnappers,[21] and serial environmental polluters have all been successfully located and tracked by UAVs. To date, no domestic criminal has been killed by remotely operated aircraft, but there are several claims of privacy violation still to be heard in American courts.[22]

[19] *US Customs & Border Protection* 27 Dec 2011) http://www.cbp.gov/xp/cgov/newsroom/news-releases/national/12272011.xml
[20] *Police Employ Predator Drone Spy Planes on Home Front* LA Times, 10 Dec 2011
[21] *Texas Civil Libertarians Have Eye on Police Drones* Houston Chronicle, 31 Oct 2011
[22] For example: *Electronic Frontier Foundation v US Department of Transportation*, filed 10 Jan 12

5. The vertical and horizontal proliferation of UAVs has been rapid and is likely to accelerate. Some 50 American companies, universities and government organisations report active engagement with the development and production of over 155 different designs. In 2010, American expenditure on UAVs reached $3 billion, and it is expected to exceed $7 billion by 2020. In round terms, this investment will constitute 77% of total global spending on UAV R&D, and around 69% of procurement.[23]

6. Sources vary, but between 76 and 80 countries are known to have either developed UAVs of their own or acquired them from foreign suppliers.[24] The United States, however, is one of only three that are currently using armed drones in military operations. The other two are Israel and the United Kingdom.

7. In Israel, the use of UAVs for real-time surveillance, electronic warfare and decoys began during the 1973 Yom Kippur war. Their success in subsequent conflicts led to the creation of Mazlat, (now Malat), a division of the state-owned Israel Aerospace Industries (IAI). Malat worked with the US AAI Corporation to develop Pioneer UAVs during the 1991 Gulf War, and there has been extensive US/Israeli co-operation since then. The operation of armed drones in Gaza, Sinai, Pakistan and Yemen has attracted criticism from the United Nations High Commissioner for Human Rights, in particular for the *"lack of transparency surrounding their use …* [and] *an accountability vacuum* [that] *affects the ability of victims to seek redress*".[25]

8. IAI has an order backlog of US$1.2 billion, with exports accounting for 76% of revenue in the second quarter of 2013.[26] The company is developing close connections with China, whose own plans for UAV development remain opaque.

9. In the United Kingdom more than £2 billion has been committed to the purchase, research and development of unmanned drones since 2007. About 25% of this sum was spent on US General Atomics MQ-9 Reaper drones, but the largest commitment—some £847 million—was to the acquisition of Watchkeeper. The Watchkeeper is an intelligence, surveillance, target acquisition and reconnaissance (ISTAR) drone built in Britain by an Anglo-French-Israeli consortium with majority ownership (51%) vested in the Israeli company, Elbit Systems.

10. The Royal Artillery has aspirations to equip Watchkeeper with a weapon system, although the drone has been beset with delay and may not be ready in time for service in Afghanistan.[27] The incorporation of an American de-icing system has also created uncertainty over export licensing. In brief, the United States Department of Defence is concerned about the involvement of Elbit Systems and the possible re-export of technology to China.

11. The Watchkeeper programme is about three years behind schedule, although it shows more promise than some of its predecessors. (The Phoenix became known as the Bugger-Off because of its frequent failure to return). Nevertheless, the RAF has been successfully flying MQ-9 Reaper UAVs in Afghanistan since October 2007, and 39 Squadron currently operates five by satellite from Creech Air Force Base in Nevada. The UK is expected to announce funding for a new armed Medium Altitude Long Endurance (MALE) drone this year, under the Scavenger programme.[28]

12. Under the Autonomous Systems Technology Related Airborne Evaluation & Assessment programme (ASTRAEA), £30 million is to be spent on "*technologies, systems, facilities, procedures and regulations that will allow autonomous unmanned vehicles to fly in UK civil airspace.*"

13. It is expected that nearly 30,000 military and civilian UAV will be operating worldwide by 2018. Many of these will be capable of carrying weapons even if they were not originally designed or procured for offensive action. During a recent visit to Pakistan, UN Secretary-General Ban Ki-moon said that:

> *"the use of armed drones, like any other weapon, should be subject to long-standing international law, including international humanitarian law."*[29]

14. Nearer to home, the United Kingdom's Joint Doctrine Note 2/11 concludes with the following apocalyptic question:

> *"There is a danger that time is running out—is debate and development of policy even still possible, or is the technological genie already out of the ethical bottle, embarking us all on an incremental and involuntary journey towards a Terminator—like reality?"*

The Ethical Context

15. The starting point for most discussions about the ethical application of lethal force is the just war tradition of St Augustine (1226–74). This requires both a just cause for going to war, (*Jus ad Bellum*), and just conduct during the ensuing conflict *(Jus in Bello).*

[23] Lucintel (2011). Growth Opportunities in Global UAV Market www.lucintel.com
[24] Sharkey, N (2011). The Automation & Proliferation of Military Drones & the Protection of Civilians 3(2) *Law, Innovation & Technology 229–240*
[25] Navi Pillay (2013). UN Security Council meeting on the protection of civilians
[26] Israel Aerospace Industries (IAI) Reports for the Second Quarter of 2013
[27] Hoyle, C (2013). Where are all the Watchkeepers? Flight Global 16 Apr 2013
[28] Cole, C (2012). Shelling Out: UK Government Spending on Unmanned Drones www.dronewars.net
[29] Press TV (2013). *UN takes issue with US, Israeli drone attacks* www.presstv.com 20 August 2013

16. Historically, advances in military technology challenge the concept of *Jus in Bello.* How can new systems, which may give an overwhelming advantage to one side over the other, be applied in an ethical manner? Is it possible to reconcile an ethical approach with perceptions of military necessity?

17. The Laws of Armed Conflict seek to promote *Jus in Bello* by upholding two fundamental principles:

(a) The principle of *discrimination* between military objectives and combatants on the one hand, and the structures of civil society and non-combatants on the other.

(b) The principle of *proportionality* of means. Acts of war should not cause damage that is disproportionate to the military objective. Harm to non-combatants is only truly collateral when it is indirect and unintended, even if foreseen. Combatants assume the status and rights of non-combatants if they surrender and lay down their arms.

18. A more recent and controversial addition to the principles of *Jus in Bello* requires agents to be held responsible for their actions. This means that blind obedience to orders—the defence of *"Befehl ist Befehl"*—cannot be relied upon by subordinates if they recognise their orders to be immoral.[30]

19. Although the just war tradition has been widely criticised as a departure from the absolute pacifism of early Christianity, it remains the principle philosophical basis for the exercise of restraint in war. Moreover, there is nothing about it that is fundamentally antithetical to the use of drones. The precision accuracy of drones allows a level of discrimination that was wholly beyond the carpet bombers of WWII, or even the most sophisticated intercontinental ballistic missiles (ICBM) of the late twentieth century. Whereas the accuracy of nuclear tipped ICBM is measured in "Circular Error Probable" (CEP) of hundreds of metres, modern drones can be targeted to the last metre. Pinpoint accuracy means that warheads can be smaller, targeting can be more precise, and the risk of collateral damage is minimised.

20. Moreover, UAVs are not prone to the emotional unpredictability of combat troops. The extent of this unpredictability, even among highly trained personnel, was emphasised by a survey of American participants in Operation Iraqi Freedom.[31]

21. The key findings have been extensively quoted, but bear repetition:

(a) Only 47% of US soldiers, and 38% of Marines, agreed that non-combatants should be treated with dignity and respect.

(b) Over a third of US soldiers and Marines believed that torture should be allowed, either to save the life of a comrade or to obtain information about insurgents.

(c) 45% of US soldiers and 60% of Marines said that they would not report a comrade who had injured or killed an innocent non-combatant.

(d) 33% of US Marines and over a quarter of soldiers claimed that mistreatment of non-combatants had not been expressly forbidden by their NCOs and officers.

(e) 31% of US Marines and 28% of soldiers reported that, despite ethical training, they had faced ethical situations in which they did not know how to respond.

(f) Ethical violations increased with exposure to direct combat experience, especially if it involved the loss of a team member.

22. It has been convincingly argued that drone "pilots", removed by many miles from contact with an enemy, will be less prone to impassioned responses and more likely to behave in a consistently ethical manner. If that proves to be untrue, then individual accountability is more easily achieved in an electronically monitored command bunker than a slit trench or a gun position.

The Legal Context

23. The translation of ethical ideals into codified laws of armed conflict has a long history. It extends, perhaps, to the Angiers Synod of AD 990 which proscribed the seizure of hostages and property.

24. Of more immediate relevance, the four Geneva Conventions, (1864–1949), codified the distinction between combatants and non-combatants. They remain the principle internationally recognised legal authority on the treatment of wounded personnel. Their emphasis is upon the rights of individual combatants.

25. The three Hague Conventions (1899–1907) concentrate upon the means of waging war, rather than upon the treatment of individuals who are caught up in it. They seek to "*diminish the evils of war, as far as military requirements permit,*" and acknowledged a general principle of restraint. Their essence is the avoidance of unnecessary suffering and an insistence that "*the right of belligerents to adopt means of injuring the enemy is not unlimited*."

[30] Frieser & Dowden, cited by Arkin, RC. "Governing Lethal Behaviour: Embedding Ethics in Hybrid Deliberative / Reactive Robot Architecture" US Army Research Office, Technical Report GIT-GVU&-07–11 www.cc.gatech.edu

[31] Mental Health Advisory Team (MHAT) IV (2006). Operation Iraqi Freedom 05–07 Final Report Office of the Surgeon General, US Army Medical Command www.armymedicine.army.mil

26. A recent illustration of the Hague approach is the 1980 "*Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects*." The 73 signatories agree to prohibit or restrict weapons whose "*primary effect is to injure by fragments which, in the human body, escape detection by X-rays; mines; booby traps; and incendiary weapons*."

27. In 1995, a fourth Hague Protocol prohibited the use of blinding laser weapons, and in 1996 the existing second Protocol was revised by the Ottawa Convention as a direct result of international pressure to ban the production and use of anti-personnel mines.

28. These foundation stones in the Law of Armed Conflict have been developed by a number of major international treaties. After 1990, in the face of repeated and major violations, significant attempts were made to improve enforcement. The UN Security Council's decision to establish the International Criminal Tribunal for the Former Yugoslavia in 1993 illustrated the trend. So did the similar tribunal for Rwanda that was established in 1994.

29. In 1998, a UN-convened conference in Rome adopted a treaty for the establishment of an International Criminal Court. To date, 122 states have signed the Rome Treaty, but three of those—Israel, the United States, and Sudan—have announced that they will not ratify it. The ICC has permanent jurisdiction to prosecute genocide, crimes against humanity, and war crimes, but an additional power to prosecute offences of aggression will not be pursued until at least 2017. Absent a fully functioning and universally supported ICC, state governments remain the chief mechanism for enforcing the laws of war.

Issues of Definition and the Role of the State

30. The UAVs that are currently in service all rely upon a degree of human intervention and supervision. They are semi-autonomous. For as long as that remains the case, there is no compelling reason for drones to be regarded as either inherently unlawful or antithetical to the just war tradition. Whether the "human in the loop" is responsible for the decision to deploy UAVs in the first place, or for general targeting policy once they are in theatre, or even for the selection of individual targets, it should remain possible to maintain a chain of accountability. But this optimistic prognosis depends upon transparency and independent scrutiny, both of the decision making process and of the safeguards to protect non-combatants.

31. Fully autonomous UAVs, capable of locating their own targets and destroying them without any human intervention are a different proposition and could, arguably, fall outside the just war tradition altogether. This is because there is, by definition, no human supervision to enforce the fundamental principles of proportionality and discrimination.[32] The present state of technology, especially so far as the Anglo-French-Israeli Watchkeeper project is concerned, may make this appear a distant prospect. But the acquisition of fully autonomous military robots has been a stated objective of the United States since 2004, and a number of systems are already in an advanced stage of development. A notable example is the Falcon HTV-2 hypersonic unmanned aircraft, which is reported to have attained test speeds of Mach 17–22 or up to 13,000mph. At such speeds, the level of human oversight is either severely limited or non-existent. An elementary conflict of software algorithms could lead a hypersonic drone off target by 5Km in less than a second.[33]

32. Nevertheless, the United States DoD formally recognises ten levels of autonomy, with an expectation that the final level, (fully autonomous swarms of UAVs with group strategic and tactical goals, distributed control, and a facility for on-board route re-planning), will be attained by 2015.[34]

33. Decisions about the military utility of fully-autonomous UAVs have to be made by individual states, and this would suggest that responsibility for defence procurement should remain firmly with government agencies. A recent announcement that the British Ministry of Defence is to negotiate the outsourcing of arms purchases to a consortium led by the American engineering group, CH2M Hill, should raise concerns about the nature of the procurement in question.[35]

34. But an even more fundamental issue for governments is whether the increase in drone operations will erode the definition of war to a point where it is all but meaningless. Brief examination of the dispute that arose between President Obama and Congress over operations in Libya suggests that this erosion is already well-advanced.[36]

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[32] Sharkey, N (2008). Cassandra or the False Prophet of Doom: AI Robots and War 23(4) IEEE Intelligent Systems 14

[33] Sharkey, N (2011). The Automation and Proliferation of Military Drones and the Protection of Civilians Law, Innovation & Technology (2011) 3(2) 229–240

[34] Quintana, E (2008). The Ethics & Legal Implications of Military Unmanned Vehicles, RUSI Occasional Paper arising from RUSI conference www.rusi.org

[35] *Daily Telegraph* Thurs 22 Aug 13

[36] Sharkey, *supra* p.232

35. The cause of the dispute was the 1973 War Powers Resolution. The Resolution requires an American president to either obtain congressional approval for hostilities or terminate a mission within 60 days:

> "[Absent a declaration of war]… *in any case in which the United States Armed Forces are introduced into hostilities or into situations where imminent involvement in hostilities is clearly indicated by the circumstances; [or] into the territory, airspace or waters of a foreign nation, while equipped for combat, except for deployments which relate solely to supply, replacement, repair, or training of such forces …"*[37]

36. The United States' support of NATO operations in Libya did not follow a declaration of war, and was not sanctioned by Congress within the stipulated 60 days. Nevertheless, the State Department maintained that military operations were legal because drone strikes did not amount to the introduction of US armed forces to hostilities.

37. The Libyan operation raises substantial questions about the traditional definitions of armed force and war. In particular:

(a) Whether the use of remotely piloted aircraft amounts to the introduction of armed forces or not.

(b) Whether the use of drones amounts to the commencement of full-blown hostilities, or merely to an action falling short of war.

38. At the time of writing, congressional approval is being sought for American intervention in Syria. Whatever the outcome, it is unlikely to resolve either of these questions conclusively because the rapid technological evolution of drones militates against definitive answers or rigid rules. Meanwhile, drones have been used for "targeted killings" of suspected terrorists in several countries that are ostensibly at peace with the United States. Among them are Pakistan, Somalia, and Yemen where a CIA armed drone killed five men on a public road in 2002.

39. For their part, the Israelis appear to have been using armed drones for "decapitation killings", over a number of years, although the extent of such operations is not publicly acknowledged. Similarly, whilst the British Royal Air Force has reportedly flown more than 20,000 drone missions in Afghanistan, the objectives, targeting policy, and geographical constraints on their use remain secret.

40. It is understandable that targeted killing by drones remains veiled by official secrecy. For the time being, it offers an unparalleled risk-free opportunity to attack terrorist suspects in remote places. But it is difficult to imagine that states more developed than Sudan or Yemen would tolerate drone intrusions on their airspace. Nor is it likely that a more militarily advanced state, such as China or Russia, would ignore extra-judicial killings by a foreign power on their soil. If secrecy continues to prevail over accountability and transparency, then there can be no guarantee that drone missions comply either with the Laws of War or with the ethical concepts that underpin them.

41. There is ample evidence that the conduct of war according to ethical and legal principles is not only moral, but also sensible. At best, resort to untrammelled indiscriminate violence may lead to short-term tactical advantage, but almost never to strategic success. To quote Elizabeth Quintana: "… *the more ethically we can conduct our warfare and the treatment of prisoners of war and civilians, the smoother the process of concluding war might become*".[38]

42. To this might be added the observation that public support for hostilities is unlikely to be lasting—especially in an age of unprecedented media scrutiny—if there is a widespread perception of unethical or illegal conduct veiled by secrecy. Moreover, given the likely proliferation of UAVs as the technology becomes cheaper and more widely available, it would be as well for the West to occupy a morally elevated position from which to condemn the future unprincipled use of drones by unstable states or terrorist groups. In this context, it is worth noting that Hizballah has flown at least six UAVs into Israel, and that crashed allied UAVs from Iraq have been recycled or reverse engineered on the border between Afghanistan and Pakistan. In Columbia, FARC is reported to have nine UAVs.[39]

Conclusions and Recommendations

43. The use of UAVs is not in itself unethical or a breach of the Laws of War. In fact, the capacity for precise targeting raises the hope that future conflicts might have a stronger ethical foundation than could ever be afforded by twentieth century concepts of nuclear deterrence. But "*precision relies on the vitality of the principle of distinction*".[40] If there is no legal enforcement of the boundary between innocent civilians and combatants then the potential moral benefits of pinpoint accuracy are lost. There can be no legal enforcement

[37] War Powers Resolution 1973, 93rd Congress, HJ Res 542, 7 Nov 1973

[38] Quintana, E (2008). The Ethics & Legal Implications of Military Unmanned Vehicles, p.11, RUSI Occasional Paper arising from RUSI conference www.rusi.org

[39] *Ibid* p.11

[40] Maxwell, M. Rebutting the Civilian Presumption: Playing Whack-a-Mole Without a Mallet? in Finkelstein, C Ohlin, J & Altman A (Eds) (2012). Targeted Killings: Law & Morality in an Asymmetrical World, Oxford University Press

without transparency and independent scrutiny. In sum, "*a lack of disclosure gives states a virtual and impermissible license to kill*".[41]

44. The problem is not that UAVs are unlawful in themselves, but that their numbers, sophistication, relative cheapness and adaptability offer unparalleled opportunities for secrecy. If there are no independent arrangements for the scrutiny of deployment and targeting decisions, then there can be no means of ensuring compliance with the basic principles of proportionality and discrimination. Just as importantly for the major democracies, public support for hostilities is unlikely to be sustained unless there is a perception of *jus in bello.*

45. Moreover, unless there is public awareness and scrutiny, UAVs that were never originally designed for offensive action could be adapted as platforms for fragmentation or Directed Energy Weapons (DEW) which might themselves be a breach of existing Hague protocols.

46. There are already specialist "Think Tanks" and research organisations dedicated to military and international affairs. Some, such as RUSI, have a distinguished history and extensive contacts within government departments, universities, and private sector defence companies. What is missing, however, is a standing legal review committee, with a remit to track technological developments in UAV and assess their specific implications for the ethical and lawful conduct of war. In order to be fully effective, such a committee would need regular input from military and commercial authorities, perhaps supported by a small secretariat. To be truly independent, it would need to be recruited from civilian and military experts, with a preponderance in favour of the former. It should answer directly to government at cabinet level, and in the interests of transparency the review committee should be capable of fulfilling a limited public information role.

47. Further information about any of the issues or recommendations raised in this paper may be obtained through the Secretary to the Association of Military Court Advocates.[42]

9 September 2013

Written evidence from the Bureau of Investigative Journalism

Executive Summary

- Britain is a key participant in drone warfare and is the only country the US has so far allowed to buy its armed Reaper drones. British pilots have conducted drone strikes using both British and US-owned drones in Iraq, Libya and Afghanistan.
- But little is understood publicly about the potential for civilian harm in drone strikes. This lack of transparency makes it hard for policymakers and the public to gauge their effectiveness.
- The UK has acknowledged only one drone strike in Afghanistan that has harmed civilians, and the Ministry of Defence says it does not collate comprehensive figures on civilian and insurgent deaths in the theatre. The US has also declined to publish overall casualty figures for its armed drone operations.
- However a recent analysis of classified military data relating to both US and UK aerial operations found that drones were "an order of magnitude" more likely to cause civilian harm than conventional air strikes.
- In light of concerning findings such as these it is doubly important that the British government establishes the international precedent of publishing a fuller record of drone strikes and their impact, to the extent that is operationally secure.

About the Bureau of Investigative Journalism

The Bureau of Investigative Journalism is an independent not-for-profit organisation that was established in April 2010. We pursue journalism that is of public benefit, undertaking in-depth research into the governance of public, private and third sector organisations and their influence.

Our work is philanthropically funded; the bulk of our funding comes from David and Elaine Potter. Further funding for specific drone projects comes from the Joseph Rowntree Charitable Trust and the Freedom of the Press Foundation, through a crowdfunding initiative. Although many journalistic organisations in the US use the philanthropic model, the Bureau of Investigative Journalism is the only unit of its kind in the UK.

Introduction

1. This submission will focus primarily on the current utility and dispersal of armed drones in both covert and military contexts. In particular, it will examine the lack of transparency surrounding the current usage of drones, and especially the lack of data concerning casualties.

2. Drones have been used in military contexts by the US and UK in Afghanistan, Iraq and Libya—situations of recognised armed conflict under the Geneva Conventions and International Humanitarian Law. The US has

[41] Alston, P (2010). Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Addendum Study on Targeted Killings UN Doc A/HRC/14/24/Add.6 www2.ohchr.org

[42] secretary@amca.org.uk

also conducted drone strikes in Pakistan, Yemen and Somalia—countries in which the legal basis for armed intervention is contested. These "covert" strikes are conducted by the Central Intelligence Agency (CIA) and Joint Special Operations Command, a military unit whose operations are highly classified.

3. Senior US officials have described drones as highly precise weapons that are capable of targeting enemies including al Qaeda and affiliated organisations while causing minimal collateral damage. But independent organisations, including The Bureau of Investigative Journalism[43] (TBIJ), the New America Foundation[44] (a Washington-based think-tank) and the Long War Journal[45] (a US-based security studies blog), have charted hundreds of civilian casualties in covert drone strikes in Pakistan and Yemen.[46]

4. As a result of the work of TBIJ and others there is more detail in the public realm about supposedly covert drone strikes—such as those conducted by the US Central Intelligence Agency (CIA) in Pakistan—than about those conducted as part of military operations over the border in Afghanistan. This submission will discuss the findings of TBIJ's two-year investigation into covert drone strikes.

5. It will also examine the key role played by British drones in the Nato-led International Security Assistance Force (ISAF) in Afghanistan. Despite having a comparatively small unmanned fleet in this theatre, British drones launch a high proportion of drone strikes in the conflict. But there is almost no information about the impact of these drone strikes, particularly on civilians. This lack of transparency means that policymakers and the public are deprived of the ability to gauge the effectiveness and accuracy of a weapons system that is widely expected to play a crucial role in future warfare.[47]

The US's Covert use of Drones

6. Since 2011, TBIJ has tracked and investigated US covert drone strikes, using sources including credible media reports, legal affidavits, field investigations, research by NGOs, leaked Pakistani government documents and social media. According to TBIJ data the US has carried out over 400 such strikes in Pakistan, Yemen and Somalia since 2002.[48]

7. The US government has repeatedly described these operations as highly accurate, targeted attacks on militant groups that pose a threat to US interests, while also causing minimal harm to civilians. John Brennan, President Obama's former chief counterterrorism adviser and now director of the CIA, has praised drones' "surgical precision" and "unprecedented ability" to distinguish between terrorists and civilians.[49] President Obama's first public comments on the drone campaign included the assertion: "I want people to understand actually drones have not caused a huge number of civilian casualties, for the most part they have been very precise precision strikes against al Qaeda and their affiliates."[50]

8. Such drone strikes have reportedly killed senior al Qaeda leaders, as well as senior commanders of several other militant organisations including the Pakistan Taliban (TTP) and the Islamic Movement of Uzbekistan (IMU). They have also killed many hundreds of others who are reported to be members of militant organisations.

9. The legal basis for covert strikes has been questioned by international experts including Christof Heyns, UN special rapporteur on extrajudicial killings, who told a UN Human Rights Council conference in 2012 in a speech dealing extensively with US covert drone strikes: "Many targeted killings take place in circumstances that are both far from any recognised area of armed conflict, where the legal threshold[s] of 'armed conflict' are not met... Current targeted killing practices weaken the rule of law... they also set dangerous precedents for the future." He added: "Some states appear to want to invent new law, or stretch existing law beyond long-accepted understanding, in an attempt to justify extraordinary and often unlawful practices that are carried out in an attempt to meet short term goals."[51]

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[43] TBIJ, Covert Drone War http://www.thebureauinvestigates.com/category/projects/drones/

[44] New America Foundation, The Drone War in Pakistan http://natsec.newamerica.net/drones/pakistan/analysis; US Covert War in Yemen http://yemendrones.newamerica.net/

[45] Long War Journal, Charting the data for US airstrikes in Pakistan, 2004–13 http://www.longwarjournal.org/pakistan-strikes.php, Charting the data for US air strikes in Yemen, 2002–13 http://www.longwarjournal.org/multimedia/Yemen/code/Yemen-strike.php

[46] To date, no civilian casualties have been confirmed in drone strikes in Somalia. However, this may be due to the enormous difficulties of identifying reliable reports from Somalia, which is discussed in more detail below.

[47] MOD Development, Concepts and Doctrine Centre, *Joint Doctrine Note 2/11 The UK Approach to Unmanned Aircraft Systems,* 30 March 2011*,* 102

[48] Two academic studies have found that TBIJ's data is the most accurate such effort: *Living Under Drones*, by Stanford and New York Universities, September 2012 (http://www.livingunderdrones.org/) and *Counting Drone Strike Deaths*, by Columbia Law School, October 2012 (http://web.law.columbia.edu/human-rights-institute/counterterrorism/drone-strikes/counting-drone-strike-deaths)

[49] John Brennan, speech at Woodrow Wilson Center: *The Efficacy and Ethics of U.S. Counterterrorism Strategy*, 30 April 2012

[50] White House YouTube channel, Your Interview with the President—2012, 30 January 2012 https://www.youtube.com/watch?v=eeTj5qMGTAI

[51] Christof Heyns, speech to UN Human Rights Council, *The human rights implications of targeted killings*, 21 June 2013 http://web.up.ac.za/sitefiles/file/47/15338/targeted%20killing%20side%20event%20geneva.pdf

10. Senior officials have also questioned the legal justifications presented for covert drone strikes, including former CIA director Michael Hayden. "Right now, there isn't a government on the planet that agrees with our legal rationale for these operations, except for Afghanistan and maybe Israel," he told a journalist last year.[52]

11. The classified nature of covert drone operations means the lack of transparency surrounding them is perhaps unsurprising. Senior Obama administration officials and even the president himself have acknowledged the use of drones in Pakistan, Yemen and Somalia.[53] But there is no official recognition of individual strikes, even years after they have taken place. The US has only rarely provided overall estimates of drone casualties, and where it has done so it has often been in stark contrast to independent estimates.[54] This means that there is little detail against which to measure the US administration's claims that drones are an exceptionally accurate weapon that eliminate terrorist threats while causing almost no civilian casualties.

12. TBIJ's research has included a particular focus on civilian casualties. The project was started partly because we felt the Obama administration's repeated claims about the minimal collateral harm being caused by covert drone strikes were not being properly scrutinised. Defining who is a civilian in the regions where drone strikes take place is complicated by the fact that the drones target non-uniformed militant groups in parts of the world where adult men frequently carry weapons.

13. A New York Times report citing three dozen Obama administration insiders speaking on condition of anonymity claimed in May 2012 that the US had adopted a definition that classed "all military-aged males in a strike zone as combatants" unless they were later proven to be civilians.[55] TBIJ classes as civilians individuals who are not believed to be members of militant groups. Where the dead are described by researchers and reporters as "locals" or "tribesmen" (as opposed to "fighters", "militants" or "Taliban", for example) our methodology is to class these as potential civilian casualties.[56]

Pakistan

14. TBIJ has amassed reports of over 370 drone strikes in Pakistan since the first recorded attack in the country in 2004. These attacks have killed between 2,500 and 3,500, of whom between 407 and 926 are reportedly civilians and at least 168 are children.[57]

15. Working with Pakistan-based researchers, TBIJ has also carried out two field investigations that have corroborated multiple reports of drones returning to the site of earlier strikes to attack those carrying out rescue work.[58] In addition to killing alleged militants, several of these "double-tap" strikes killed civilian. Following TBIJ's research the tactic was labelled a possible "war crime" by UN special rapporteur on extrajudicial killings Christof Heyns—an opinion that UN special rapporteur on counter-terrorism Ben Emmerson QC later said he "would endorse".[59]

16. The US government has consistently claimed that civilian casualties in drone strikes in Pakistan are very low. Early this year Dianne Feinstein, chair of the Senate Select Committee on Intelligence—one of the congressional bodies charged with overseeing the CIA's use of drones—told a hearing that drone casualties from CIA strikes were "typically in the single digits" each year.[60]

17. TBIJ's findings contradict this claim. So too do the findings of other independent monitoring organisations including the New America Foundation and the Long War Journal, both of which also track numbers of drone casualties. According to the tallies of all three organisations, minimum civilian casualties

[52] Doyle McManus, Los Angeles Times, *McManus: Who reviews the U.S. "kill list"?* 5 February 2012 http://articles.latimes.com/2012/feb/05/opinion/la-oe-mcmanus-column-drones-and-the-law-20120205

[53] In Obama's YouTube interview, he said: "obviously a lot of these strikes have been in the FATA [Pakistan's Federally Administered Tribal Area]", see 28m https://www.youtube.com/watch?v=eeTj5qMGTAI. For Yemen and Somalia, see Chris Woods, TBIJ, *Is the secret war in Yemen and Somalia secret no longer?* 16 June 2012 http://www.thebureauinvestigates.com/2012/06/16/obama-partially-declassifies-military-attacks-in-yemen-and-somalia/

[54] For example, in August 2011 anonymous officials told the New York Times that 2,000 people including 50 civilians had died in drone strikes on Pakistan since 2001, and no civilians had been killed since the previous May. On the same day TBIJ published its own data, identifying reports of 385 civilians killed. *See* Scott Shane, New York Times, *CIA is Disputed on Civilian Toll in Drone Strikes*, 11 August 2011 http://www.nytimes.com/2011/08/12/world/asia/12drones.html?pagewanted=all; Chris Woods, TBIJ, *Over 160 children reported among drone deaths*, 11 August 2011 http://www.thebureauinvestigates.com/2011/08/11/more-than-160-children-killed-in-us-strikes/

[55] Jo Becker and Scott Shane, New York Times, *Secret "kill list" proves a test of Obama's principles and will* 29 May 2012 http://www.nytimes.com/2012/05/29/world/obamas-leadership-in-war-on-al-qaeda.html?pagewanted=all

[56] TBIJ, *Covert US strikes in Pakistan, Yemen and Somalia—our methodology* August 10 2011, updated February 2013 http://www.thebureauinvestigates.com/2011/08/10/pakistan-drone-strikes-the-methodology2/

[57] TBIJ, Covert Drone War—The Datasets http://www.thebureauinvestigates.com/category/projects/drone-data/

[58] Chris Woods and Christina Lamb, Sunday Times/TBIJ, *CIA tactics in Pakistan include targeting rescuers and funerals*, 4 February 2012 http://www.thebureauinvestigates.com/2012/02/04/obama-terror-drones-cia-tactics-in-pakistan-include-targeting-rescuers-and-funerals/; Chris Woods, TBIJ/Salon, *Bureau investigation finds fresh evidence of CIA drone strikes on rescuers* 1 August 2013 http://www.thebureauinvestigates.com/2013/08/01/bureau-investigation-finds-fresh-evidence-of-cia-drone-strikes-on-rescuers/

[59] Owen Bowcott, *The Guardian*, *Drone strikes threaten 50 years of international law, says UN rapporteur* 21 June 2012 http://www.theguardian.com/world/2012/jun/21/drone-strikes-international-law-un; TBIJ, *UN team to investigate civilian drone deaths* 25 October 2012 http://www.thebureauinvestigates.com/2012/10/25/united-nations-team-to-investigate-civilian-drone-deaths/

[60] Senate Intelligence Committee nomination hearing for CIA director nominee, 7 February 2013 http://www.c-span.org/Events/Senate-Committee-Hears-from-CIA-Director-Nominee/10737437877/

have exceeded Feinstein's estimate for the four most intense years of the campaign—2008, 2009, 2010 and 2011. Only in 2012 did a steep fall in reported collateral harm mean that reported civilian casualties were in single digits as Feinstein described.

18. The US administration's estimate is also contradicted by the Pakistan government. In March this year Pakistan's civilian government told UN special rapporteur on counterterrorism Ben Emmerson QC that at least 400 non-combatants—and possibly 600—had died in drone strikes. This figure closely matches TBIJ's own estimate of confirmed civilian deaths.[61]

19. The CIA's rate of drone usage in Pakistan has fallen sharply in the past 18 months. From a peak of 122 drone strikes in 2010, TBIJ has recorded fewer than 20 in January-August 2013. TBIJ's analysis finds that fewer people are now killed in each drone strike—in the first half of 2013 the average strike killed four people, a third of the rate of the same period of 2010.[62] The rate of civilian deaths has also declined, from a minimum of 100 in 2009 to no confirmed civilian casualties at all in 2013 at the time of writing. This coincides with increased public and political interest in drone strikes and particularly in civilian harm, as a result of which targeting policies appear to have been tightened.

Yemen

20. In Yemen, corroborating reports of drone strikes is more complex than in Pakistan as both the CIA and US military operate drones alongside US military fixed-wing (ie manned) aircraft, Yemen's own air force and according to some reports also the Saudi air force. TBIJ has found reporting clearly indicating at least 54–64 drone strikes, alongside 82–101 other air strikes where it is unclear whether they were carried out by fixed-wing or unmanned aircraft.[63] At least 268 people—including over 21 civilians—have died in confirmed drone strikes, with a further 289 or more including 23 non-combatants dying in possible additional drone strikes.

21. The multiple overlapping aerial forces operating in Yemen means that it is difficult to conclusively establish accountability for individual incidents. At times it is clear that Yemen's air force could not have carried out particular attacks because of the limitations of its ageing air fleet—a fact acknowledged by President Abdurahman Hadi, who told an audience in Washington last year his air force could not carry out night-time missions.[64]

22. The US government has at times denied responsibility for attacks that have later been shown to be the work of its armed forces. On occasion, this has meant that compensation to victims has been paid by the Yemeni government even though the strikes have later been shown to be carried out by the US. As a result families of victims have received far less compensation than the families of civilians killed in US operations in Afghanistan.[65]

23. What is clear is that the number of drone strikes has escalated in Yemen. In 2012 for the first time since 2002 the country saw more covert strikes than Pakistan (although many of these could not be confirmed as drone strikes), a trend that has continued into 2013. In July and August 2013, during the international terror alert that led many governments to close their embassies in the Middle East, there were nine confirmed drone strikes in the country in two weeks, killing 21–49 of whom at least six were civilians, including two children. While drone use appears to be declining in Pakistan, the increased activity in Yemen indicates there is little prospect of the non-battlefield use of drones ceasing.

Somalia

24. The continuing instability and violence that plague much of Somalia severely limits the reliable reporting of attacks in the country. Again tracking US covert drone strikes in the country is complicated by the presence of other forces: the US has carried out manned air strikes and cruise missile strikes, and the African Union Mission in Somalia (Amisom) operates a peacekeeping force comprising soldiers from a number of African nations.[66]

25. What news does emerge is frequently vague and it is possible that some incidents go unreported, both by the media and by bodies such as the UN's monitoring group.[67] TBIJ has identified three to nine US drone strikes in the country, killing between seven and 27 people since 2007.[68] No civilians have been confirmed

[61] Alice K Ross, TBIJ, *Pakistan government says "at least 400" civilians killed in drone strikes* 15 March 2013 http://www.thebureauinvestigates.com/2013/03/15/pakistan-government-says-at-least-400-civilians-killed-in-drone-strikes/

[62] Jack Serle and Chris Woods, TBIJ, *Six-month update: US covert actions in Pakistan, Yemen and Somalia* 1 July 2013 http://www.thebureauinvestigates.com/2013/07/01/six-month-update-us-covert-actions-in-pakistan-yemen-and-somalia/

[63] TBIJ, Covert Drone War—The Datasets http://www.thebureauinvestigates.com/category/projects/drone-data/

[64] President Abdurahman Hadi, Speech at Woodrow Wilson Center, 3 October 2012 http://www.wilsoncenter.org/sites/default/files/yementranscript.pdf; Jack Serle, TBIJ, *Yemen's "barely functional" air force points to US involvement in strikes* 29 March 2012 http://www.thebureauinvestigates.com/2012/03/29/barely-functional-why-us-is-likely-to-be-behind-yemens-precision-airstrikes/

[65] Chris Woods, *The Guardian*, *Who is held to account for drone deaths in Yemen?* 6 September 2012 http://www.theguardian.com/commentisfree/2012/sep/06/drone-deaths-yemen

[66] Jack Serle, TBIJ, *US and others have "licence to ignore international law" in Somalia,* 24 September 2012 http://www.thebureauinvestigates.com/2012/09/24/us-and-others-given-licence-to-ignore-international-law-in-somalia/

[67] Ibid.

[68] TBIJ, *Somalia: reported US covert actions 2001–2013* 22 February 2012 http://www.thebureauinvestigates.com/2012/02/22/get-the-data-somalias-hidden-war/

killed in any of these incidents. However given the considerable challenges of reporting from the country it is possible that this record is far from complete.

26. A Bureau investigation has revealed that two individuals who died in US drone strikes in Somalia had previously been British citizens, but had lost their UK nationality under orders from the Home Secretary.[69] Mohamed Sakr, who was born in London, and his childhood friend Bilal al-Berjawi, who came to the UK as a baby, were stripped of their citizenship on national security grounds and were suspected of involvement in militant groups in Somalia. They died in two drone strikes a month apart in early 2012.

Military Drones

27. Covert drone attacks represent a small proportion of overall drone strikes. Military data, where it has been published, is sometimes complex, reporting variously the number of strikes, the number of missiles fired (several missiles can be fired in a single strike) and the number of overall missions flown (most drone missions are flown for surveillance and do not lead to strikes).

28. According to official figures provided to TBIJ by the US Air Force, between 2008 and 31 October 2012, together the US and UK carried out almost 1,200 drone strikes in Iraq, Afghanistan and Libya.[70] The same figures showed that the vast majority of military drone missions did not involve firing missiles: between January and October 2012, one in 30 sorties in Afghanistan led to a strike.

29. In October 2012, following discussions with TBIJ, the US Air Force started publishing data on how many missiles were fired by drones in Afghanistan, alongside similar statistics for overall air operations. However months later it reclassified the material on the grounds that they "disproportionately focused" attention on drone operations.[71]

30. The statistics showed the increasingly important role played by drones in ISAF air operations: in 2012, almost one in eight missiles was fired by a drone, up from one in 20 the previous year. In January 2013, the last month for which the data was unclassified, 23% of all missiles launched in ISAF air strikes were fired by drones.[72]

British Military Drones

31. The UK is the only nation the US has so far allowed to buy and pilot its MQ-9 "Reaper" drone. British drones started flying combat missions in Afghanistan in late 2008, piloting them from Creech Air Base in Nevada. In addition April 2012 the UK opened its first drone base on its own soil, at Waddington Air Base in Lancashire, from which British drone pilots fly combat missions in Afghanistan.[73]

32. In October 2012 the Royal Air Force (RAF) announced it was to double the size of its fleet from five to 10 Reaper drones within six weeks.[74] For comparison, although the US has declined to say how many combat drones it flies in Afghanistan, TBIJ estimates it is over 150.

33. In addition to flying RAF drones, British drone pilots regularly "embed" with the US Air Force to fly US drones.[75] A Ministry of Defence (MoD) spokesman told TBIJ these embeds can last up to three years, with "fewer than 10" pilots embedded at any one time.[76] Even when in a US embed, RAF drone pilots follow British rules of engagement, the MoD told TBIJ.

34. In April 2013 defence minister Andrew Robathan MP said in response to a parliamentary question that British pilots had been embedding for drone missions since 2006 and had flown US drones in "approximately 2,150 operational missions" in Afghanistan, Iraq and Libya.[77] This was the first time it had been revealed that British pilots had flown drones in Iraq.

35. Figures released by Robathan in September 2013 show that British pilots launched 299 drone strikes between 2008 and 31 July 2013.[78] The MoD later confirmed to the Bureau that this represented strikes launched from UK drones only, and did not include UK pilots operating in US embeds. An analysis of these

[69] Chris Woods and Alice K Ross, TBIJ, *Former British citizens killed by drone strikes after passports revoked,* 27 February 2012 http://www.thebureauinvestigates.com/2013/02/27/former-british-citizens-killed-by-drone-strikes-after-passports-revoked/; Chris Woods, TBIJ, *Parents of British man killed by US drone blame UK government,* 15 March 2013 http://www.thebureauinvestigates.com/2013/03/15/parents-of-british-man-killed-by-us-drone-blame-uk-government/

[70] Chris Woods and Alice K Ross, TBIJ, *Revealed: US and Britain launched 1,200 drone strikes in recent wars,* 4 December 2012 http://www.thebureauinvestigates.com/2012/12/04/revealed-us-and-britain-launched-1200-drone-strikes-in-recent-wars/

[71] Alice K Ross, TBIJ, *Erased data shows 1 in 4 missiles in Afghan air strikes now fired by drone,* 12 March 2013 http://www.thebureauinvestigates.com/2013/03/12/erased-us-data-shows-1-in-4-missiles-in-afghan-airstrikes-now-fired-by-drone/

[72] Ibid.

[73] Alice K Ross and Chris Woods, TBIJ, *Protesters march against UK drones as MoD reveals "drone sharing" with US,* 29 April 2012 http://www.thebureauinvestigates.com/2013/04/29/protesters-march-against-uk-drones-as-mod-reveals-drone-sharing-with-us/

[74] Nick Hopkins, The Guardian, *UK to double number of drones in Afghanistan,* 22 October 2012 http://www.theguardian.com/world/2012/oct/22/uk-double-drones-afghanistan

[75] HC Deb April 24 2013 C906W

[76] Ross and Woods, *Protesters march against UK drones as MoD reveals "drone sharing" with US* (op cit)

[77] HC Deb April 24 2013 C906W

[78] HC Deb September 5 2013 C480W

figures against those provided to TBIJ by the US Air Force would suggest that Britain carried out 22% of all drone strikes in the theatre between 2008 and 2011.[79] The comparison shows the proportion of strikes carried out by British pilots increased steadily year on year. In 2011—the last year for which comparison is possible—they launched 30% of all strikes.

Civilian Casualties in British Military Drone Strikes

36. As with covert drones, there is no official public accounting of either militant or civilian casualties. The RAF publishes details of selected operations in weekly bulletins: these sometimes include brief descriptions of drone strikes but do not always reveal how many people they were believed to have killed, often simply referring to "insurgents" dying.[80] The bulletins are a "snapshot of current operations", the Ministry of Defence (MoD) has confirmed, rather than a comprehensive record.

37. The United Nations Assistance Mission in Afghanistan (UNAMA) publishes annual and half-yearly reports on civilian casualties caused by both ISAF forces and insurgents. Since 2012, the first year for which data for drone strikes was published in a discrete category, it has recorded 12 verified strikes that killed 31 civilians; seven of these incidents were in the first half of 2013.[81] However when charting ISAF incidents it does not specify which force was responsible for any incident. In September 2013 the MoD informed the campaign group Drone Wars UK in response to a Freedom of Information request: "we can confirm that we hold no information that suggests that any of the strikes listed in the UNAMA report [covering the first half of 2013] were carried out by British Reaper Remotely Piloted Air Systems (RPAS)".

38. The MoD has made only limited disclosures about civilian casualties. In response to a Freedom of Information request made by Drone Wars UK in July 2011, it said there had been "one incident involving UK Reaper where there were six civilian casualties" since 1 July 2008. Also in July 2011, the MoD told the Guardian that four civilians had been killed in a March 2011 drone strike on a pick-up truck in Helmand province.[82] When contacted by TBIJ to explain the apparent discrepancy between the accounts, the MoD explained that there had been a clerical error in the response to the Freedom of Information request. It has not announced any further civilian casualties.

39. This appears to be an exceptional rate of accuracy. At the time of the July 2011 disclosures, British pilots had carried out well over 100 drone strikes—this would mean fewer than 1% of strikes had caused civilian casualties. For comparison, in Pakistan between 2008 and 2013, 18% of drone strikes have reportedly caused civilian casualties, according to TBIJ's data.

40. A press officer told TBIJ in July 2013 that the UK does not collate figures on civilian casualties: "because of the immense difficulty and risks of collecting robust data". It also declined to provide total casualty estimates.

41. However in July 2013, Dr Larry Lewis, principal research scientist at the US government-funded research organisation the Center for Naval Analyses and Sarah Holewinski, director of Civic, an advocacy group for victims of conflict, published an article in security studies journal PRISM that raised questions about how successful Coalition drones were in avoiding civilian casualties. The article was based in part on Dr Lewis's analysis of classified military data on behalf of Coalition forces. Most of Lewis's findings remain classified: the study was carried out on behalf of the Joint Center for Operational Analysis, a military research unit. However the executive summary of the research asserted that drone strikes killed as many civilians per incident as fixed-wing strikes, and are "an order of magnitude more likely" to kill civilians than fixed-wing aircraft—a startling claim that runs contrary to the depiction of drones as an exceptionally accurate weapons platform.[83]

42. Lewis claimed in an interview that his study had found that collateral harm was greater in drone strikes by a factor of 10.[84] This claim was initially reported in the press as saying drones killed 10 times more civilians than fixed-wing air strikes. TBIJ however understands that the correct interpretation is that drone strikes are 10 times more likely than fixed-wing attacks to kill civilians.

43. No public explanation has been offered as to why, according to this analysis, drones are so much more likely to cause non-combatant harm than fixed-wing air operations. Other analysts have questioned this finding, telling TBIJ it does not appear to tally with their understanding. Both the data analysed by Dr Lewis and the bulk of his findings remain classified, so it is not possible to scrutinise them.

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[79] Alice K Ross, TBIJ, *UK drones three times more likely than US to fire in Afghanistan*, 6 September 2013 http://www.thebureauinvestigates.com/2013/09/06/uk-drones-three-times-more-likely-than-us-to-fire-in-afghanistan/

[80] The campaign group Drone Wars UK has created a list of some of these engagements: Drone Wars UK, *UK Drone Strikes* http://dronewars.net/uk-drone-strike-list/

[81] United Nations Assistance Mission in Afghanistan, *Annual Report on the Protection of Civilians in Armed Conflict in Afghanistan 2012*, February 2013 http://unama.unmissions.org/LinkClick.aspx?fileticket=K0B5RL2XYcU%3D; *Mid-Year Report on the Protection of Civilians in Armed Conflict in Afghanistan 2013*, July 2013 http://unama.unmissions.org/LinkClick.aspx?fileticket=EZoxNuqDtps%3d&tabid=12254&language=en-US

[82] Nick Hopkins, The Guardian, *Afghan civilians killed by US drone,* 5 July 2011 http://www.theguardian.com/uk/2011/jul/05/afghanistan-raf-drone-civilian-deaths

[83] Dr Larry Lewis, Joint and Coalition Operational Analysis, *Drone Strikes: Civilian Casualty Considerations declassified executive summary*, 18 June 2013 http://www.cna.org/sites/default/files/research/Drone_Strikes.pdf

[84] Spencer Ackerman, The Guardian, *US drone strikes more deadly to Afghan civilians than manned aircraft—adviser,* 2 July 2013 http://www.theguardian.com/world/2013/jul/02/us-drone-strikes-afghan-civilians

44. The study was widely reported to pertain to US operations. However the data analysed in the study was for Isaf operations—meaning it included both British and US drone missions. Dr Lewis analysed a year's worth of data, from mid-2010 to mid-2011. This coincides with a point when British drones were exceptionally active—as the data obtained by TBIJ shows, British pilots were responsible for between a quarter and 40% of all missiles fired by drones.

45. It is not known whether British-piloted drones are significantly more or less likely to harm civilians than US-piloted ones. The MoD claims it does not collate such data. However Dr Lewis's study indicates that data is being collated about civilian casualties in ISAF aerial operations. If British operations are not being recorded discretely this raises concerns over accountability for incidents of civilian harm. It also raises questions of whether British drone strikes—which made up a significant portion of the data analysed—are significantly more likely to cause civilian deaths than British fixed-wing air strikes.

Recommendations to the Committee

46. It is vital that Parliament and the public are able to evaluate whether British drone operations are as accurate as is claimed, and to assess the merits of this emerging weapons system. TBIJ therefore urges the Committee to encourage the Government to increase transparency around drone operations in Afghanistan, to the extent that is operationally secure. This is important not only in order to understand current operations, but also to set an international precedent for increased transparency around the use of drones.

47. Although the MoD claims it does not collate casualty data, it appears that at least some data does exist—that analysed by Dr Lewis. In the interests of transparency the MoD should publish the British portion of the data analysed by Dr Lewis, to the extent that is operationally secure.

48. In particular, the Committee should call on the MoD to clarify whether British-piloted drone operations are significantly more likely to cause civilian harm than British-piloted fixed-wing missions, and whether Dr Lewis's findings are reflective of British drone usage.

September 2013

Written evidence from the Network for Social Change

Summary

— The Network for Social Change is commencing a long-term project on military developments focused on the security implications of low profile deployments including unmanned combat aerial vehicles (UCAVs), the operation of Special Forces and privatised military and security companies.

— At this early stage it is offering evidence in two areas: the manner in which UCAVs form part of the wider development of "remote control", and the issue of the proliferation of UCAVs and its security implications.

Introduction

1. The Network for Social Change (Network) will be funding a major project, running for at least three years, looking at a key aspect of the changing face of international conflict. The project will examine the move towards more "discrete" and low profile forms of military activity, including the use of Unmanned Aerial Combat Vehicles (UCAVs) but linked also to the expanded use of Special Forces, private military companies, rendition and cyber warfare measures. It thus places RPAS/UAV/UCAV trends in a wider context and would argue that this is an appropriate level for analysis and policy formulation that the Committee may wish to consider.

2. A pilot stage of the project commenced in January 2013 and its work has already involved meetings with many non-government organisations, universities and think tanks. It has commissioned and financed initial work on a number of themes, including the proliferation of armed drones, but the programme is still at the pilot stage. In due course it is likely to engage in a number of areas of concern to the Committee but at this stage seeks to offer the committee some initial analysis on just two aspects of remote control—the wider context of military changes within which UAVs fit and some recent evidence on the rate of proliferation of UAVs, especially armed drones, that may be of interest to the Committee. For the purpose of this note, the UAV/UCAV designations are used rather than RPAS, as this tends to be the current practice in the international aerospace literature.

The Wider UCAV Context

3. In 1993 President Clinton's incoming Director of Central Intelligence characterised the changed post-Cold War international security environment as one in which the United States and its allies had slain the dragon but now faced a jungle full of poisonous snakes. In this more uncertain world, many of the forces relevant to the Cold War were substantially reduced, including strategic and tactical nuclear weapons, heavy armour and anti-submarine systems, while others that were appropriate to responding to a "jungle" environment were

retained and even enhanced. They included expeditionary warfare forces encompassing the Marine Corps and aircraft carrier battle groups, as well as Special Forces and diverse air-delivered stand-off weapons.

4. Following President George W Bush's election in 2000, the incoming Secretary of Defense, Donald Rumsfeld, continued this trend, seeking to enhance the ability to meet security challenges with minimal deployed forces. This was known as "war lite" and was used substantially in responding to the 9/11 atrocities. Thus in Afghanistan the Taliban regime was terminated and the al-Qaida movement dispersed by the intensive use of air power, the deployment of Special Forces and the utilisation of Northern Alliance militias as surrogate ground forces. In Iraq in 2003, the forces used to terminate the Saddam Hussein regime were barely a quarter of the size of the forces deployed twelve years earlier to evict the Iraqis from Kuwait.

5. In the event, the apparent success of "war lite" was short-lived, with operations in both Afghanistan and Iraq failing. The former conflict has evolved into a 12-year war and in Iraq the war lasted eight years and left a country that was deeply insecure and prone to endemic violence. In practice, "war lite" became "war heavy", with foreign troop deployments peaking at close to 200,000 in Iraq and 140,000 in Afghanistan. Both conflicts were also immensely costly with over 200,000 people killed, several hundred thousand injured, more than eight million refugees and costs that may eventually exceed $4 trillion.

6. The wars became highly unpopular with domestic political constituencies and many coalition partners began progressively to withdraw forces from both countries. President Obama's election was followed by successive decisions to retreat from Iraq and Afghanistan. The former withdrawal was completed by the end of 2011 and the great majority of all combat troops will have left Afghanistan by the end of 2014. Most US, UK and other forces in Afghanistan are currently engaged in the complex logistics of withdrawal, with little combat patrol activity.

The Move to Remote Control

7. However, in the wake of the failure of "boots on the ground" has come a major trend towards meeting challenges by other means, of which the use of armed drones has been the most prominent in the public eye. The Committee will no doubt have access to details of UCAV development and deployment and it is noteworthy that armed drones have been used on a large scale in Afghanistan and Pakistan and also in Yemen, Somalia and Iraq, principally by the United States but with the UK prominent with its Reaper operations in Afghanistan.

8. The past decade has also seen a major expansion of the size and use of Special Forces. This developed initially from operations in Iraq and was focused on the intensive use of night raids, but also became a major if largely unreported feature of operations in Afghanistan and Pakistan, with other engagements in Yemen, Somalia, Mali and Syria. In Afghanistan, in particular, night raids by US Special Forces have formed a significant part of military operations frequently occasioning controversy, with opposition extending to the Afghan government.

9. At the forefront of Special Force expansion has been the United States. US Special Operations Command (USSOCOM) was established in 1987. It brings together and integrates Special Force operations of the US Army, Air Force, Navy and Marine Corps and has expanded from a strength of 42,743 in 2008 to 63,650 last year with a planned further growth to 71,000 in 2015, approaching the size of the entire British Army by that time. The UK, too, has seen an expansion of Special Forces, including the establishment in 2006 of the Special Forces Support Group drawing on personnel from 2 Para, the RAF Regiment and the Royal Marines. NATO has expanded its Special Operations HQ at Mons in Belgium and it is also notable how some countries have developed particular abilities in Special Force operations within militaries that are otherwise relatively small, Australia and New Zealand being examples.

10. In parallel with armed drone and Special Force operations has come a marked increase in the use of private military and security companies. The private security industry overall is reported now to be worth over $100 billion a year and includes an estimated 20,000 personnel in Afghanistan alone. Within this wider field, the United States and the UK are reported to dominate in the area of private military companies with an estimated 70% market share.

11. The growth and increasing use of remote control as a means of responding to overseas challenges appears primarily to be a consequence of the failure of the initial responses encompassed in the "war on terror" and it raises two questions which will be explored as part of the intended work of the Network's Remote Control Project. One will be the question of accountability, including parliamentary accountability, given the "below the radar" nature of much of the activity, and the other will be the effectiveness and possible blowback of the approach, given that the al-Qaida movement may have been much dispersed but has loosely associated but effective elements active in many countries, most notably Yemen, Somalia, Nigeria, Iraq and Syria. Is remote control any more appropriate as a response than boots on the ground to what may primarily be a potent idea rather than an integrated revolutionary movement?

PROLIFERATION

12. A specific question which the initial pilot stage of the Network project has addressed is the issue of the proliferation of UCAVs and the implications of such proliferation for regional security and also for processes of arms control. Research was commissioned from the public domain intelligence group *Open Briefing,* and the following comments draw on this study.

13. The main developers and users of armed U(C)AVs have been the United States and Israel, with the UK the other most significant user of UCAVs, but a number of other countries are now heavily involved in the indigenous development and deployment of armed systems. **Israel** is the leading exporter of all UAVs in terms of volume, variety and range of customers, with around 40% of world exports, the value over the past eight years being estimated at $4.6 billion. Israel Aerospace Industries produces three UCAVs, including the high altitude long-endurance Heron TP.

14. Israel's defence posture is currently undergoing considerable change, the overall trend being away from substantial ground forces and towards greater use of air power with an emphasis on highly capable strike aircraft and missiles. While UCAVs may be used in Gaza and Lebanon, and there are unconfirmed reports of use against militia supply routes in Sudan, Israel is also in a position to use the Heron TP for long-range operations against Iran, should there be a war. It is likely that UCAV developments will feature markedly in Israeli defence R&D, both for export and for its own defence posture.

15. After the United States and Israel, the country that appears to be the next most important state in terms of UCAV development is **China**. *Open Briefing* has identified 46 different UAVs (plus variants) in use or under development and is in a position to develop a robust export market as it is not a signatory of the Missile Technology Control Regime or the Wassenaar Arrangement. China is also in the process of an indigenous GPS alternative, the Beidou-2 satellite network, intended to achieve global coverage by 2020. This will assist China in developing a long-range accurate UCAV strike capability which will greatly enhance export potential and be a source of UCAV proliferation.

16. While **Russia** has been involved in UAV developments for many years, its record is poor and it has even imported UAVs from Israel. There are strong indications that Russia is now placing far more emphasis on UAV programmes, no doubt having observed the intensity of their use by the US in South Asia and elsewhere. *Open Briefing* has identified 55 UAVs (and variants) with six of these being armed. Russian doctrine for UCAV operations appears to be very much a work in progress, but its counterinsurgency operations against the Caucasus Emirates may utilise them, and Russia's much-expanded interests in the Polar regions are likely to be enhanced if robust long-endurance UAVs and UCAVs become available.

17. In addition to Israel, two Middle East states have substantial UAV programmes, both with UCAV elements. *Open Briefing* has identified **Turkey** as having 24 different UAVs (plus variants) in use or under development, including four UCAVs. Two of these are Israeli imports but two are under development by Turkish Aerospace Industries Inc. The deployment of substantial numbers of indigenous UCAVs is some years off, but Turkey has an active and prominent aerospace industrial base and looks to be a major regional power with strong arms export potential.

18. Perhaps least appreciated outside of specialist analysis are the activities of **Iran** in the UAV/UCAV field, some of them supported by reverse engineering or copying of foreign systems obtained by diverse means. *Open Briefing* has identified 17 different UAVs (plus variants) in use or under development, of which six are UCAVs. Since the revolution over thirty years ago Iran has had to depend for its air force largely on "legacy" aircraft that have proved difficult to maintain and may be largely obsolete. While it has been able to obtain some useful modern armaments from some states, a notable example being ground-launched anti-ship missiles from China, it still sees its indigenous UAV/UCAV programmes as being important for its defence and is proud of its achievements to date. This is an area of work on which Iran can be expected to place considerable emphasis in the coming years.

19. The **Indian** armed forces have operated UAVs for over a decade. *Open Briefing* has identified 21 different UAVs, 16 of which are indigenous and five imported from Israel, but only one of the indigenous UAVs is currently in service. India deploys two Israeli UCAVs and has started to develop its own UCAVs, two of which are reported to be under development. In August of this year, the new head of the Defence Research and Development Organisation, Avinash Chander, announced that the organisation would test fire precision guided munitions from UCAVs "within a couple of months".

PROLIFERATION IMPLICATIONS

20. Many aspects of UAV/UCAV developments are relatively straightforward in terms of technology, and many components are dual use and readily available on the open market. There are reported to be well over 400 companies world-wide engaged in the development and manufacture of a wide variety of drones, many of them serving civil functions. The networking of operations for military purposes may be more complex but is becoming more established as techniques and equipment are taken from civil industries. Partly because of this it is apparent from this initial research that a number of countries are actively engaged in the development and deployment of UCAVs, and importing of UCAVs will become progressively easier, especially as arms control processes are minimal.

21. Perhaps the most significant aspect of this matter is that countries such as the United States have clearly found UCAV operations very useful and that they consider such operations legally justifiable, even when undertaken in the territory of sovereign states. This effectively sets a precedent that is likely to be emulated, and numerous examples could be suggested in the years to come. For example, Russia may on some future occasion justify UCAV operations against rebels sheltering in Georgia or Azerbaijan, China may feel justified in their use in Tibet, Myanmar or Vietnam, Turkey against Kurdish separatists in Iran or Iraq, and Iran may feel justified in using UCAVs against opposition forces in Iraq. In all such cases there may be international consternation but the states concerned could readily point to US, UK or Israeli operations as showing the way.

22. Thus if the United States regards UAV use as acceptable it will be very difficult to argue against this for other states. For countries such as the US and UK, the use of UCAVs may so far seem to be highly attractive and to form a major part of the remote control response to security challenges. It is not clear that the implications of embracing such an outlook have been thought through.

13 September 2013

Note: The Network for Social Change is a group of around one hundred people, originally formed nearly thirty years ago, who work together to fund progressive social change. In addition to numerous small grants made primarily to charities engaged in social change, one of the methods of operation is to fund more substantial major projects over a period of several years. A recent example was multi-year funding for *Peace Direct* which supports grass roots conflict resolution initiatives in many countries, and a current example is the *Great Transition* project of the *New Economics Foundation,* concerned with the analysis, modelling and management of environmentally sustainable economies.

The Remote Control Project is overseen by a core group comprising Shalni Arora, Professor John Finney, Doro Marden, Graham Prescott and Professor Paul Rogers. Its research officer is Caroline Donnellan and the project is hosted by the Oxford Research Group. A copy of the proliferation study undertaken for the pilot project by *Open Briefing*, completed in early September, will be published on www.openbriefing.org by the end of September but can be made available to the Committee before publication. This evidence was drafted by Paul Rogers.

Written evidence from Northrop Grumman Corporation (NGC)

Executive Summary

1. This submission records the views and experience of Northrop Grumman Corporation (NGC) and references, where appropriate, the prior Northrop Grumman submission made to the Defence Select Committee's inquiry into the *Contribution of ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance) to Operations* dated 19 May 2009.

2. The following evidence is derived from 70 years of leadership in this field, including delivery of more than 100,000 unmanned aircraft systems (UAS). This has culminated in today's next generation fully autonomous unmanned aircraft that have demonstrated flight at all altitude regimes, can stay on station for more 40 hours, successfully land and takeoff again from moving vessels at sea, and operate safely in national airspace with airworthiness certification. Northrop Grumman only manufactures fully autonomous UAS and draws a distinction between UAS and Remotely Piloted Air Systems or RPAS. Northrop Grumman UAS have a pilot-in-command at all times with an on-board and pre-programmed (but real-time changeable) computer flying the aircraft. RPAS are remotely piloted through a communication link to a ground based pilot responsible for aircraft control (altitude, heading and airspeed) in addition to mission accomplishment. Northrop Grumman refers to UAS and not RPAS in the remainder of this submission.

3. Northrop Grumman has produced, sold and operated more UAS, than any other company in the world. We offer systems and capabilities in all domains including undersea, over land, in air and in space. Advances in UAS technology have enabled them to perform multiple missions, from the traditional defence and security applications to assisting humanitarian operations. In addition to the support of coalition forces deployed to Afghanistan Iraq, Libya and other locales, Northrop Grumman's RQ-4 Global Hawk UAS have provided non-military disaster assistance by keeping under surveillance devastated areas in Japan following the tsunami, in Haiti after the earthquake, and in support of firefighting efforts in the California fires of 2007. Additionally, the US National Aeronautics and Space Administration (NASA) uses Global Hawk purely for scientific research, over land, in the arctic and over the blue water oceans of the world. Further, other Northrop Grumman-built UAS have also tracked suspected pirates, have watched over stranded fishermen, and have supported coalition forces at a tactical level by providing ISR capability in remote parts of the world. While Northrop Grumman is a current leader in UAS we have always been at the forefront of UAS innovation. Our research efforts in autonomy include cooperative engagement across a family of systems including mission scenarios that pair unmanned systems with manned or unmanned systems. Additionally, we are building the first common mission management system and architecture that has the ability to control multiple types of UAS from a single ground station.

4. The UK faces a contemporary security environment with diverse challenges, ranging from coalition/non-coalition operations, activities in the Falkland Islands and domestic security and maritime domain awareness, to fisheries enforcement and humanitarian assistance. A common factor in confronting these challenges is the need for accurate, time sensitive and persistent situational awareness. Commanders gain this awareness from a layered intelligence/ISR network that monitors both wide and tactical areas while concurrently extracting detailed, target quality information. Global Hawk (Triton), with its ability to provide overall situational awareness and to cross-cue other platforms to collect or take action can provide real-time intelligence that can save lives. Fielding an optimally constituted UAS fleet allows for missions to meet the defined requirements without putting people into harm's way. Northrop Grumman UAS Global Hawk (Triton), Fire Scout, Firebird and BAT have been in operation with multiple users for a number of years. The Global Hawk (Triton) system just passed the 100,000 flight hours mark while Fire Scout has accumulated more than 10,000 flight hours in support of ships at sea and coalition forces ashore. These systems are highly reliable and, as US programmes of record, could be leveraged by the UK investigating future UAS operations.

Nomenclature (RPAS, UAS and "Drone")

"What do we mean when we talk about Remotely Piloted Air Systems (RPAS), Unmanned Aerial Systems (UAS) and associated terms?"

- RPAS stands for Remotely Piloted Aircraft System.
- UAS stands for Unmanned Aircraft System.
- "Drone" is a colloquial term used by the media that is inexact in its description.

We believe that UAS are different from RPAS and are much more than an aircraft, much more than a vehicle. They require advanced sensors and communications; they require ground control stations (or ship-board stations) and; intelligent exploitation dissemination systems.

Further:

- RPAS are aircraft, such as medium-altitude long endurance (MALE) unmanned aircraft that are flown with a remote aircraft control stick by a ground based pilot-in-control through a direct link to the aircraft.
- UAS are autonomous aircraft, flown by an on-board computer but controlled by a pilot from a ground station. These can fly routes that are entirely pre-programmed or a route that is entirely "ad-hoc" as changed by the pilot-in-command. Autonomy separates command and control. Autonomy allows the aircraft to control itself, leaving the pilot free to command the aircraft and the mission.

The large UAS are all controlled by a qualified and certified pilot who commands the aircraft from the ground (or the ship) much as the pilot of a Tornado controls the aircraft from the cockpit. Given the types of missions typically performed by UAS (surveillance, reconnaissance and similar long duration, dwell intensive missions) the flight can be completely pre-programmed or changed en-route through ad-hoc collection or manoeuvering. Executing an entire mission with a computer flown (pilot commanded) aircraft nearly eliminates pilot-induced flight control mishaps. For example, the RQ-4 Global Hawk flight control computer generates hundreds of flight control inputs ***per second***—all in response to actual flight conditions in order to ensure the aircraft meets desired fight parameters, while a pilot, in an advanced fighter cockpit, can only change inputs at best, once every two seconds.

Current Utility

"For what purposes are RPAS used currently?"

5. UAS can and perform a number of missions today, depending on the payload. Some of these uses include:

1. Surveillance of wide areas:
   - Signals intelligence (SIGINT).
   - Image intelligence (IMINT).
   - Maritime domain awareness.
   - Ground, air and sea moving target intelligence.
2. Reconnaissance of designated areas:
   - Precision targeting and strike.
   - Full motion video, spot reconnaissance.
   - Situational awareness of friendly forces.

3. Scientific:
   - — On-board platforms for collection of scientific data.
   - — Surveillance of arctic ice fields.
   - — Study and surveillance of weather patterns and hurricanes.
   - — Study of atmospheric gasses and other phenomena.
4. Humanitarian:
   - — Post disaster situational awareness for tsunami, earthquake and fire disasters.
   - — Location of survivors.
   - — Search-and-rescue operations over vast swaths of blue ocean.
5. Wide area communications relay:
   - — Relay and data translations.

6. In a similar manner, UAS offer the same capabilities of endurance, technology-for-manpower, reduced costs and risks when the warfighter engages in Irregular Warfare, from stability operations to counter-insurgency and counter-terror campaigns. While Irregular Warfare often is viewed as a manpower-intensive activity, UAS can balance the mission-risk ratio in selective areas, such as surveillance, reconnaissance and high risk functions, like counter-IED, combat rescue or mine-clearing. At the same time, UAS can make the entire force better by extending the reach of the commander and the ISR network with communications relays that link the force in real time.

"What RPAS capabilities do the UK military and intelligence communities currently possess or operate?"

According to the House of Commons Library Standard Note on UAVs entitled *Unmanned Aerial Vehicles (drones): an introduction* the UK currently operates 330 RPAS in Afghanistan.[85]

Remotely Piloted Air System	*Number of Remotely Piloted Aircraft*
Reaper	5
Hermes 450	9
Desert Hawk III	239
Black Hornet	64
Tarantula Hawk	18
Total	**335**

"What governance and oversight arrangements are in place for the use of RPAS in the UK and overseas?"

7. All military remotely piloted aircraft (UAS) are treated as UK military aircraft and subject to the same regulations as military aircraft. Full guidance on the use of UAS is contained in the Civil Aviation Authority's (CAA) publication *CAP 722-Unmanned Aircraft System Operations in UK Airspace*.

(a) The following excerpts of CAP 722 were copied from http://www.caa.co.uk/docs/33/CAP722.pdf

> *1.1 CAP 722, "Unmanned Aircraft System Operations in UK Airspace—Guidance", is compiled by the Civil Aviation Authority's Flight Operations Policy Department (FOP). It is intended to assist those who are involved in the development of UAS to identify the route to certification, in order to ensure that the required standards and practices are met by all UAS operators.*
>
> *1.2 Overall, the purpose of the document is to highlight the safety requirements that have to be met, in terms of airworthiness and operational standards, before a UAS is allowed to operate in the UK. Whilst UAS flights beyond the limits of visual control (defined herein) are currently restricted to segregated airspace, the ultimate aim is to develop a regulatory framework which will enable the full integration of UAS activities with manned aircraft operations throughout UK airspace.*
>
> *1.3 In advance of changes to this document, updated information is contained on the CAA website at www.caa.co.uk/uas*
>
> *3.1 UAS operators who wish to cross an international FIR/UIR boundary to another country must comply with the Regulatory and ATM procedures applicable to the territory over which the UAS is flown, which may differ from UK regulations. While DAP will provide guidance on cross border ATC procedures, guidance on foreign national procedures should be sought from the appropriate State National Aviation Authority (NAA)/MoD.*

[85] HL Deb 30 October 2012 cWA116

"What lessons have been learnt from RPAS operations in Afghanistan, and elsewhere (including present and planned weapons), and how will this enable the future development of doctrine on their use?"

8. We would reference Northrop Grumman's prior evidence submitted the Defence Committee for the inquiry into the C*ontribution of ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance) to Operations* announced on 19 May 2009.

"How dependent is the UK RPAS programme on technology, training and operational support from the USA?"

9. UK RPAS programmes are not dependent on technology, training and operational support from the USA. Instead, the UK should take advantage of the relationship that exists between US and UK armed forces to leverage capability that has been developed by the US Government and US industry under contract to the US Government. Equipment development, capability, CONOPS, sustainment theories, and operational insights should all be available for export and, where applicable and appropriate, collaborative discussion between the two countries.

Tomorrow's Potential

"What additional capabilities will the UK seek to develop from now to 2020?"

10. UAS offer great potential to contribute to missions performed by the UK Armed Forces and non-military government agencies in a more effective manner, at a much lower cost. Some missions can provide a broad spectrum of ISR collection capability to support joint combatant forces in worldwide peacetime, contingency and wartime operations. Additionally, many missions that have traditionally been under the exclusive purview of manned assets should be considered for assumption by UASs. These include Anti-Submarine Warfare, Mine Warfare, Surface Warfare, Search and Rescue, Electronic Warfare, AEW&C and a multitude of other missions. The systems can also be used for various civil or commercial missions such as border patrol, port surveillance, hurricane monitoring, disaster relief support, and high/low-altitude scientific research.

11. UAS complement manned and space reconnaissance systems by providing near-real-time coverage using radar, imagery intelligence (IMINT) sensors, signals intelligence (SIGINT), and communications relay capability.

Other Missions

(a) Missile Defence:
  (i) Ballistic missile defence with a long endurance sensor to detect missile launch over—the-horizon from UK Forces.
  (ii) Wide area air and cruise missile surveillance.
  (iii) Augment wide area moving target intelligence surveillance with active, integrated signals intelligence—providing farther range cover with faster target identification.

(b) Offensive and Defensive capabilities:
  (i) Long endurance electronic attack of hostile air, maritime and ground systems.
  (ii) Extremely long range precision strike.
  (iii) Suppression of enemy air defences (SEAD).

(c) Air-to-air refueling for manned and UAS aircraft.

(d) Localized, ad hoc precision, navigation and timing networks to augment or replace space-based GPS systems.

(e) Raids, Assaults and Power Projection:
  (i) Tomahawk and manned aircraft.
  (ii) Special Forces.
  (iii) Non-combatant evacuation.

(f) Maritime Intercept Operations:
  (i) Monitor and interdict WMD.
  (ii) Monitor and interdict terrorists, supplies and finances.
  (iii) Anti-piracy operations.
  (iv) Maritime domain awareness.
  (v) Anti-submarine warfare surveillance and reconnaissance support.
  (vi) Port security operations.
  (vii) Close cooperation with coast guard/search and rescue.
  (viii) Prevention of terror attacks.
  (ix) Riverine operations.

(x) Secure key infrastructure.

(xi) Patrol and prevent hostile forces use of waterways.

(g) Support Land Operations:

(i) Raids and assaults.

(ii) Teaming and layer of forces.

"What current and prospective partnership working on RPAS is the UK engaged in?"

"What governance and oversight arrangements are in place for such programmes?"

"What are the associated costs?"

12. Teaming of manned aircraft and UAS or "layering of forces" can yield substantial gains in both mission effectiveness and cost efficiencies. For example, a typical Joint Task Force anti-piracy mission might include 20 ships, a maritime patrol aircraft squadron and maritime helicopters. Personnel in this task force number approximately 7,000. The area that this current task force can cover is roughly 100,000 nm^2. The flight operation and support and personnel costs for this force are more than £5M/day and £1M/day respectively. By creating a future force that reduces manned ships by 65%, integrates UAS (eg three MQ-4C Global Hawk/ Tritons and seven MQ-8C Fire Scout UAS) plus five to seven maritime helicopters and with *no manned maritime patrol aircraft,* the mission effectiveness and cost efficiencies change is dramatic. The future integrated task force can:

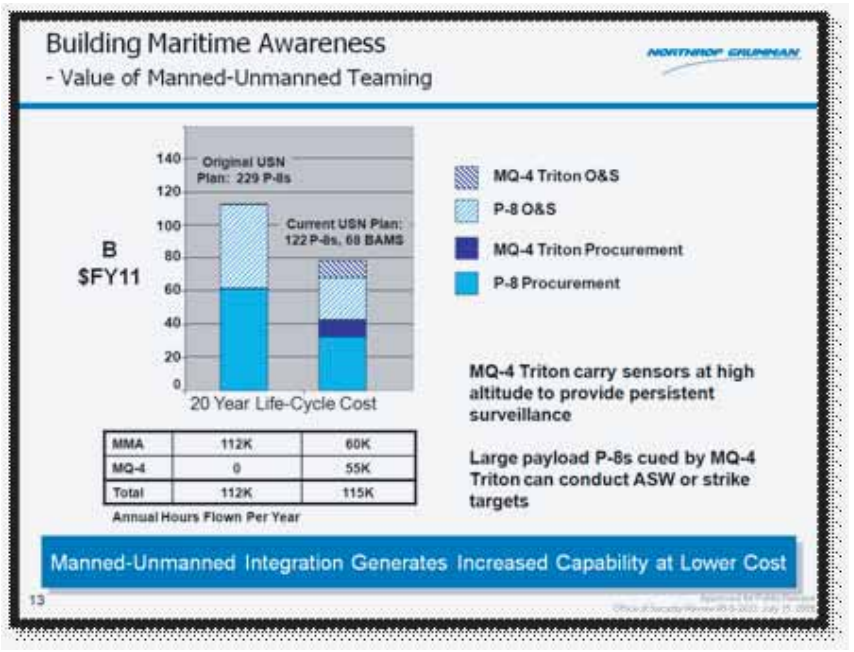
— Can cover 480,000nm^2, 81% more than the current task force.

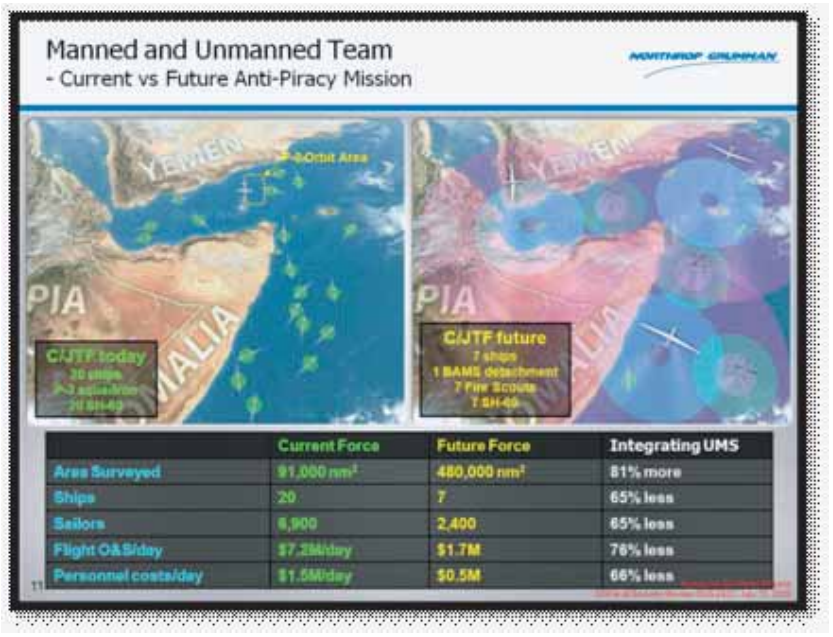
— Only needs seven ships, a 65% reduction in ships required in the Task Force.

— Only needs 2,400 Sailors, a 65% reduction.

— Flight O&S/day cost reduced to £1 million, a 76% reduction.

— Personnel costs/day can be reduced by 66% (see charts attached).





Approved for Public Release, Office of Security Review 09-S-2433; 15 July 2009

Constraints

"What constraints exist on the use of RPAS in the UK and overseas?"

"What air worthiness and certification requirements apply?"

"What restrictions apply to insertion into civil airspace?"

13. The primary consideration for flying UAS in UK and international airspace is ensuring de-confliction from other aircraft. Originally, pilots relied on "see and avoid" techniques to avoid a mid-air collision. With the advent of jet aircraft, radar and procedural control have become the dominant means to de-conflict aircraft. Modern commercial aircraft also incorporate on-board sensors, such as a Traffic Collision Avoidance System, to provide safe separation from other aircraft.

14. Currently procedural and/or radar control provides safe separation for UAS with other aircraft. More sophisticated "sense and avoid" on-board systems are under development and will allow for far greater integration within UK and international airspace.

Ethical and Legal Issues

"What governance and accountability arrangements are in place for UK operated RPAS?"

15. UAS do not present truly unique ethical or legal issues when employed in combat. Whether the pilot is in the cockpit or on the ground, the pilot must rely on the same cues and follow the same rules of engagement and international law. Unarmed UAS are flown in accordance with established national and international rules.

Conclusion

The current state of sophisticated next-generation UAS allow for total ground control of the UAS at all times while negating any opportunity that pilots may have to make flight control errors leading to mishaps. Further, the future state of the technology will allow for increasing capabilities to execute missions where it makes little sense to send a pilot into harm's way.

State-of-the-art UAS technology provides autonomous operations that separates the control of flight of the aircraft from the control/command of the mission by the aircraft commander. The aircraft commander retains control of the mission, and all rules of engagement requiring human assessment and decision making remain supported. Autonomous flight control allows the commander to focus on the key decision elements rather than flight management so mission decisions are less prone to error due to distraction. Continued development of autonomous control and enhanced communications will allow for much more complex and dangerous missions to be executed without loss of a human aircrew.

September 2013

Written evidence from Dr David Goldberg

Question: *Nomenclature—defining the terms RPAS, UAS and "drone"*

[1] Which term to apply to the subject under consultation involves the Defence Committee in somewhat of a circular argument—as the inquiry is couched in terms of one specific category, namely, "Remotely Piloted Air [sic] Systems"**.** The Committee seems unique in its choice of that phraseology! The choice of terminology, of course, is separate from the question of how to define that, or any other, word(s).

[2] National civil aviation regulators are engaged on this quest for terminological exactitude. The UK's Civil Aviation Authority is widely regarded globally as the standard—setter, notably in connection with its regularly updated publication, *Unmanned Aircraft System Operations in UK Airspace—Guidance.*[86] The section on "Abbreviations and Glossary" states that:

> "the terminology related to UAS [sic] operations continues to evolve and therefore . . . [t]he terms listed . . . are a combination of the emerging International Civil Aviation Organisation definitions, other 'common use' terms which are considered to be acceptable alternatives, and a number of 'legacy' terms."

For anyone seeking definitions of the several terms (RPAS, UAS, or drone) arguably that is probably the best source. In addition, another authoritative source is the "Abbreviations and Glossary" Section of Circular 328, published in 2011 by the UN body, the International Civil Aviation Authority.[87]

[3] Activity is also going on at the European level. D-G Enterprise and Industry published its "Road Map" (and three Annexes) during June 2013,[88] as the Final Report of the European Remotely-Piloted Aircraft Systems [sic] Steering Group.[89] The main term deployed throughout is RPAS, "Remotely Piloted Aircraft System".

[4] The term "drone" is largely used in popular parlance and news stories . This reflects journalistic need for brevity and adoption of a term widely used among military personnel. Decades ago, the term originally indicated a pilotless, radio-controlled military target towing aircraft.

> In 1931, the British developed the Fairey "Queen" radio-controlled target from the Fairey IIIF floatplane and in 1935 produced another radio-controlled target, the "DH.82B Queen Bee", derived from the de Havilland Tiger Moth biplane trainer. Through some convoluted path, the name of "Queen Bee" is said to have led to the use of the term "drone" for remote-controlled aircraft.[90]

[5] The term "drone" is now virtually synonymous with, and linked to, the usage of these vehicles by several armed forces to perform actions which continue to receive widespread opprobrium and/or criticism.[91] On 29 October 2013, Mr Ben Emmerson QC., as Special Rapporteur on the promotion and protection of human rights while countering terrorism, will present his Report to the General Assembly,[92] concerning his inquiry into the "civilian impact, and human rights implications of the use drones [sic] and other forms of targeted killing for the purpose of counter-terrorism and counter-insurgency."

[6] Even the All Parliamentary Group on the subject is entitled "All-Party Parliamentary Group on *Drones"* [emphasis added] with the purpose "To examine the use of drones [sic] by governments for domestic and international, military and civilian purposes."[93] In the author's opinion, the scope of the Group's focus (as evidenced by entries on its website) has been unbalanced—in a quite noteworthy manner, only interested on the more sensationalist, negative (in their opinion) use of "drones".[94] An approach with greater perspective is to be undertaken by the Parliamentary Office of Science and Technology, which has announced work into unmanned aerial vehicles.

> This POSTnote will provide an overview of the range of current and future applications of commercial drones, covering both small drones and larger aircraft. It would look at the potential benefits to the UK and would consider issues that need to be addressed such as how to avoid collisions, privacy concerns and insurance.[95]

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[86] <http://www.caa.co.uk/docs/33/CAP722.pdf> accessed 11 Sept 2013

[87] <http://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf> accessed 11 Sept 2013

[88] <http://ec.europa.eu/enterprise/sectors/aerospace/uas/> accessed 11 Sept 2013

[89] Set up by the Commission in 2012 it comprises "group of stakeholders gathering the main organisations and experts interested in the integration of RPAS into the European aviation system: EASA, EUROCONTROL, EUROCAE, SESAR JU, JARUS, ECAC, EDA, ESA, ASD, UVSI, EREA and ECA."

[90] Greg Goebel, "Unmanned Aerial Vehicles", <http://www.vectorsite.net/twdrn.html> accessed 11 Sept 2013

[91] See eg, "The US Drone Program is Fatally Flawed", <http://intelligencesquaredus.org/debates/upcoming-debates/item/905-the-us-drone-program-is-fatally-flawed&tab=4> accessed 11 Sept 2013

[92] <http://www.un.org/en/ga/third/67/dialogues.shtml> accessed 11 Sept 2013

[93] See < http://www.publications.parliament.uk/pa/cm/cmallparty/register/drones.htm> accessed 11 Sept 2013

[94] See <http://appgondrones.wordpress.com/> accessed 11 Sept 2013

[95] <http://www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/work-programme/planned-work/

[7] More technically precise terminology—such as "unmanned aerial vehicle" (UAV) or remotely piloted aircraft (RPA)—is preferred by aviation professionals, government regulators and manufacturers (the last trying—understandably—to steer clear of a term which is perceived to be associated (rightly or wrongly) with civil-liberty infringing surveillance or military attack systems. However, such terms, do not refer to the related and required control and communication elements and merely to the flight object. As has been rightly said:

> "It's about the datalink, stupid. The craft is essentially a conduit, an eye in the sky. Cut off from its back end, from its satellite links and its data processors, its intelligence analysts and its controller, non-autonomous drones are as useless as an eyeball disconnected from the brain."[96]

In any event, it is essential to make clear distinctions between (i) the aerial component and (ii) the control and communication system components that are necessary for operation. As the President and CEO of the Association for Unmanned Vehicle Systems International has said, "…there is nothing unmanned about an unmanned system."[97]

[8] Finally, there are a several "subcategory" definitions that should be borne in mind: "first person view" (FPV) for aircraft are flown via an on-board camera that is live-streamed to an operator on the ground;

[9] The present author would urge the Committee to adopt the terminology of the "remotely piloted aircraft" and "remotely piloted aircraft systems" as generic descriptors. The acronym RPAS foregrounds two crucial aspects of this type of vehicle: (a) these vehicles are not literally "unmanned" as there is a human operator (aka a "pilot") operating and (hopefully) controlling them and (b)—from a regulatory and legal perspective the vehicle is an "aircraft".

[10] RPAS may be defined as:

> A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation.[98]

NB: This might include a "first person view" (FPV) RPA, for aircraft are flown via an on-board camera that is live-streamed to an operator on the ground;

[11] Crucially, this definition characterises the vehicles as "aircraft", which as the ICAO Circular states implies they:

> should be able to operate in airspace, mixed with variety of manned aircraft (eg from gliders to large airliners) under instrument (IFR) or visual (VFR) flight rules adhering to the requirements of the specific airspace in which they are operating.

Question: *Ethical and legal issues arising from the use of RPAS*

[12] The author would counsel the Committee against becoming embroiled in matters of so-called "ethics" (and is this a "harder" sounding word and/or concept than "morality"? or just a preference for Greeks over Romans?!) Reasonable people reasonably disagree about what *should* or *should not* be done in given circumstances. The European Court of Human Rights has often stated that there is no consensus European morality and that Member States are free to figure out their own rules within the so-called "margin of appreciation". This principle, and that of subsidiarity, should also apply within the state amongst citizens.

[13] As regards legal issues pertaining to RPAS operations, is the Committee distinguishing between a) military users b) state-non-military users and c)civilian users? Further, it is not clear if by "legal" issues, the Committee refers to regulations and/or law/legal topics arising out of the deployment of RPASs?

[14] It should be emphasised that the key rationale for regulation from the perspective of aviation regulators—whether national, regional or international—is the safe integration of RPASs into the national air space.

Period

[15] In the UK, at least as far as non-commercial, *civilian* (non-commercial) use is permitted the applicable regulations are contained in the Air Navigation Order (2009) (ANO) made under the Civil Aviation Act (2006).[99] The two main relevant Articles of the ANO are contained in "PART 22—Aircraft in Flight", are 166 and 167. Article 167 is about "small unmanned aircraft"; Article 167 is about "Small unmanned surveillance aircraft" (as defined). Both Articles refer to the "person in charge" of the RPAS and Article 167 refers to a "person under the control" of the "person in charge".

[96] <http://motherboardtv.tumblr.com/post/59807933754/its-about-the-datalink-stupid> accessed 11 Sept 2013
[97] <http://www.auvsi.org/AUVSI/AUVSINews/AssociationNews/> accessed 11 Sept 2013
[98] <http://itlaw.wikia.com/wiki/Remotely_piloted_aircraft_system> accessed 11 Sept 2013
[99] UK Statutory Instrument (SI) 3015/2009 <http://www.legislation.gov.uk/uksi/2009/3015/contents/made> accessed 12 Sept 2013

[16] This Response now highlights the main legal (aka law) topics pertaining to the deployment of drones:

[16.1] *"Airworthiness" ie, "permit to fly":*

RPASs require a certificate of airworthiness. A European Aviation Safety Agency air-worthiness certificate is required if the vehicle is more than 150 kg and which is neither experimental nor used for State purposes (military, customs, police, search and rescue, fire-fighting, coastguard or similar activities or services). Otherwise, the vehicle is subject to national regulation.

[16.2] *Pilot certification to fly:*

Currently, in the UK, the situation is rather confused. The Civil Aviation Authority states:

> Evidence of pilot competency is required when making an application for permission to operate a UA but currently there are no pilot licences for the operation of UA...The CAA has accepted the Basic National UAS Certificate (BNUCTM) and Basic National UAS Certificate—Small Unmanned Aircraft (BNUC-STM), as evidence of Remote Pilot competency. These certificates are type-specific qualifications which take into account the specific operating capabilities of the UA.[100]

[16.3] *Radio spectrum:*

> given that no dedicated spectrum has so far been assigned to RPAS, civilian RPAS flying today for research or commercial purposes rely on ad-hoc frequency assignments. Radio spectrum availability is therefore an important element for the growth of RPAS services.[101]

The matter of regulating the allocated frequency spectrum for the control/command communications ("non-payload") as well as payload communications (eg, cameras/sensors etc.) is crucial for RPAS operations going forward. Spectrum is allocated at World Radio Conferences under the auspices of the International Telecommunications Union. The matter will be discussed and concrete solutions are to be agreed at WRC 2015[102]:

> to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices **30**, **30A** and **30B** for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution **153 (WRC-12).**

An important safety and security issue concerns the immunity of such wireless systems from being "hacked into" and the purpose, direction etc., of the flight being altered, perhaps for malign reasons.

[16.4] *Liability:*

This issue concerns who legally is to be liable and for what in the context of an RPAS deployment going wrong—*as it will*.[103] Essentially, the rules for this kind of aircraft vehicle need to embrace a system in which, at least, the (i) owner of the aircraft; (ii) the RPAS operator; and (iii) the pilot-in-command are differentiated but also all included. Practically, this entails that liability for damages caused by the fall of UAV on the ground should be attributed to the operator, ie to the person or entity that...sets up the system, assures its functioning and publishes his/its position.[104] One safety-critical issue which raises the matter of liability acutely is that of "over flight of people":

> As operations are very likely to involve flying Unmanned Aerial Vehicles (UAVs) in congested areas and above assemblies of persons, it is apparent that the safety of the public may be compromised unless steps are taken through government intervention to regulate the activity.[105]

The CAA Guidance (CAA 722, Section Three Chapter 2) states that:

> For UA of 20 kg and below, ANO 2009 Articles 166 and 167 define the separation distances that must be applied. For UA operations over 20 kg, the over flight of persons may be allowed subject to the degree of airworthiness certification and appropriate operational procedures such as Ballistic Recovery Systems (BRS) (eg parachutes).

[16.5] *Insurance:*

EC Regulation 785/2004 came into force on 30 April 2005 requiring most operators of aircraft, irrespective of the purposes for which they fly, to hold adequate levels of insurance in order to meet their liabilities in the event of an accident. This EC Regulation specifies amongst other things the minimum levels of third party accident and war risk insurance for aircraft operating into, over or within the EU (including UAS) depending on their Maximum Take-Off Mass (MTOM) Details of the insurance requirements can be found on the CAA website under "Mandatory Insurance Requirements". UK legislation which details insurance requirements is set out in Civil Aviation

[100] CAA Doc. 722, Section 3, Par 7.1

[101] CAP 722, Unmanned Aircraft System Operations in the UK airspace—Guidance, chapter 3

[102] Agenda for WRC-15 RESOLUTION 807 (WRC12) Agenda for the 2015 World Radiocommunication Conference <http://www.cept.org/ecc/groups/ecc/cpg/client/introduction/agenda-for-wrc-15>

[103] "These Expensive Drones Are Actually The Most Accident-Prone Aircraft In The US Air Force" <http://www.businessinsider.com/bloomberg-study-shows-drones-most-accident-prone-in-air-force-2012–6> accessed 12 Sept 2013

[104] "A Regulatory Framework to Introduce Unmanned Aircraft Systems into Civilian Airspace" ESPI Report 31, European Space Policy Institute 2011 <http://www.espi.or.at/images/stories/dokumente/studies/ESPI_Report_31.pdf> accessed 11 Sept 2013

[105] <http://www.caa.co.uk/docs/1727/20080515Article98ImpactAssessment.pdf> accessed 11 Sept 2013

(Insurance) Regulations 2005.[106] It is also true that insurance companies are still trying to work out to assess the risks associated with RPAS deployment in order to market commercially viable products. Part of the problem is the lack of long-term, reliable accident data on which to base actuarial assumptions.

[16.6] *Privacy and data protection:*

The European Commission Staff Working Paper contains a section on privacy and data protection (2.4.3).[107] Its main points are that (a) all actions related to RPASs must respect the right to respect for privacy as set out in Article 8 (ECHR); (b) the draft EU General Data Protection Regulation will apply to data processing by private or commercial RPAS operators, *thus, there is no need for a new or modified legal privacy or data protection regime* (emphasis added); (c) nationally, public video surveillance using RPASs might be restricted by local laws and might need harmonising; (d) the draft Police and Criminal Justice Data Protection Directive will set the minimum standards for state data processing; (e) "Privacy and Data Protection by Design" should be applied to payload development and automated deletion of data could become a principle for civil RPAS operations.[108] The matter is also referred to in the European RPAS Group's Road Map and Annexes (see supra, Question 1, para 3, fn 3).

Finally, the Committee might be interested to note that the European Commission has called for bids for a "Study on privacy and data protection issues related to the use of civil RPAS."[109]

The Committee would do well, in the present author's opinion, to heed the *limitations* of exigencies arising from the promotion of the notion of privacy pointed out in the tender document:

> In Europe, there is a comprehensive legal framework ensuring citizens' privacy and data protection rights. This framework applies to RPAS operations. The Charter for Fundamental Rights of the EU recognizes everyone's right to respect for private and family life, home and communications (Article 7) and to protection of personal data (Article 8). Protection of personal data is a right that is closely linked but separate from the right to privacy. Article 16 of the Treaty on the Functioning of the European Union enshrines the right to the protection of personal data. These fundamental rights are implemented through specific EU and national regulations. It is important to ensure that this legal framework adequately covers the new threats resulting from RPAS operations.

Further, the tender document states:

> *The European Court of Human Rights considers that monitoring (without recording) of individuals in a public place does not interfere with private life, making public space monitoring lawful.*[110] (emphasis added). The analysis of the RPAS related threats should, in consequence, focus on the two following issues: the surveillance/monitoring activities in non-public areas and the processing of recorded data. Directive 95/46/EC together with the related national laws (later, the proposed General Data Protection Regulation of 25 January 2012) regulate the collection and processing of personal data. Other national regulations, like those on video surveillance, contribute to address broader privacy issues. The application of this general framework should ensure an adequate protection of European citizens against the misuse of RPAS. It might however require some unwarranted governmental intrusion through the use of the unmanned aerial vehicles commonly called drones, and for other purposes.

The key points to bear in mind are:

(i) the plethora of already existing (and the forthcoming GDPR) instruments and court judgements aimed at protecting privacy; and

(ii) that an action may well infringe someone's privacy *but yet be justifiable on other grounds, promoting and protecting other rights!*

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[106] <http://www.legislation.gov.uk/uksi/2005/1089/contents/made> accessed 30 Nov 2012; see also <http://www.caa.co.uk/default.aspx?pageid=4510> accessed 30 Nov 2012

[107] See supra fn 4

[108] ???

[109] <http://ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item_id=6878&lang=en&title=Study-on-privacy-and-data-protection-issues-related-to-the-use-of-civil-RPAS> accessed 11 Sept 2013

[110] 13 See §59 of the Judgment by the European Court of Human Rights (Fourth Section), case of Peck v. United Kingdom, Application no. 44647/98 of 28 January 2003

Written evidence from Drone Wars UK

1. This document complements our earlier submission which focused on the ethical and legal issues associated with the growing use of armed UAVs.[111] In this short addition we want to respond to two further questions identified by the Committee in relation to this inquiry.

Nomenclature

2. As the Committee suggests, there is some confusion around the naming of unmanned platforms. We tend to use the term "drone" as this has always been the term used to describe unmanned platforms and is readily understood by the public and the media. However this term is sometimes seen by those within the industry and the military as derogatory as, they argue, unmanned aircraft are much more sophisticated today than the original unmanned aircraft/drones which were mainly used for target practise. In order to respond to these sensibilities we tend to use the term "unmanned aerial vehicle" (UAV) when appropriate as an alternative to "drone".

3. "Remotely Piloted Air Vehicle" or when referring to the whole system, "Remotely Piloted Air Systems", are recent terms developed with the specific purpose of overcoming the negative conations associated with "drone" and to communicate the idea that such aircraft are not in fact "unmanned" (or "autonomous") but controlled by crews on the ground. We believe however this term will be redundant in a relatively short space of time as UAVs will no longer be remotely controlled from the ground. Indeed the current generation of UAVs being developed and test flown (ie Mantis, Taranis and the US X-47b) are not piloted remotely from the ground but rather fly autonomously following pre-programmed mission.

Constraints on the use of RPAS in the UK and Overseas

4. As the Committee will no doubt be aware there is on-going work, most recently through the ASTRAEA programme, to lift the restrictions on larger UAVs flying within non-segregated airspace in the UK. Current use within the UK is rightly restricted by the Civil Aviation Authority (CAA) due to safety concerns. As these restrictions are limiting training with larger military UAVs—the Watchkeeper programme in particular appearing to be affected—and with the drawdown of British forces from Afghanistan meaning UAVs may well be returning to the UK, we expect this to become more of a pressing issue.

5. Despite these pressures the Committee will recognise that the safety of the public must come first. UAVs are a long way from being able to fly safely in civil airspace. Drone Wars UK has documented for example more than 100 crashes involving the larger types of UAVS (type II and III) between 2007 and 2012 (see table overleaf).

Table

DOCUMENTED TYPE 2 & 3 MILITARY UAV CRASHES 2007–12

Year	*Number*	*Type of UAV*	*Where*
2012	25	10 unnamed	8 Afghanistan
		8 Predators	3 US
		1 Reaper	3 Pakistan
		1 Gray Eagle	2 Israel
		1 BAMS (Global Hawk)	1 Lebanon
		1 Schiebel S-100	1 South Korea
		1 Searcher	1 India
		1 Heron	1 Somalia
		1 ANKA	1 Djibouti
			1 Sudan
			1 Turkey
			1 Not reported
2011	25	12 Predators	9 Afghanistan
		3 Reapers	5 US
		2 unnamed	4 Djibouti
		1 Sentinel	2 Turkey
		2 Heron	1 Seychelles
		1 Pterodactyl	1 Iran
		1 Global Hawk	1 Yemen
		1 Shadow	1 Pakistan
		1 DARPA HTV	1 China
		1 Global Observer	

[111] http://www.publications.parliament.uk/pa/cm201314/cmselect/cmdfence/writev/1090/m04.htm

Year	*Number*	*Type of UAV*	*Where*
2010	19	11 Predators	7 US
		3 unnamed	7 Afghanistan
		1 Orbiter	1 Palestine
		1 Skylark	1 Iraq
		1 Reaper	1 Canada
		1 A160T	1 Pakistan
		1 Heron	1 Italy
2009	21	11 Predator	13 Afghanistan
		3 Reaper	4 Iraq
		2 unnamed	1 UK
		1 Hunter	3 US
		1 Luna	
		1 Gnat	
		1 Sperwer	
		1 Hermes	
2008	13	9 Predators	8 Iraq
		2 Sperwer	5 Afghanistan
		1 Reaper	
		1 unnamed	
2007	8	7 Predator	5 Iraq
		1 A160T	1 Afghanistan
			1 US
			1 Not reported

Notes: CLASS I UAVs weight less than 150kg; CLASS II are between 150kg and 600kg and CLASS III weigh more than 600kg. In 2012 one crash involved two drones, hence although 25 UAVs are involved there are only 24 locations. A UAV crashed at Parc Aberporth, West Wales on 23 September 2009. Although not named, the UAV was believed to have been a Selex Falco rather than a Watchkeeper

Sources: USAF Accident Investigation Board (AIB) Reports, Wikileaks War Logs and reports from the general and military press

6. A number of Class II and III UAVs in service with British forces in Afghanistan have crashed including one Reaper UAV in April 2008, and eight Hermes 450s between 2007–12.[112] In addition, according to figures released to the Guardian by the Ministry of Defence, around 435 British Class I UAVs have been lost in Afghanistan.[113]

7. We believe that the Committee should be extremely wary of suggestions that British forces will be able to regularly fly and train with larger UAVs within non-segregated and even within segregated British airspace within a few years. Without a dramatic improvement in the reliability and safety record of military UAVs it is highly unlikely that the CAA as regulators nor the British public would accept this.

8. The lack of opportunity to train with these system due to safety and public perception issues has obvious serious implications, not least of which is that they will not be able to be brought into service—as appears to be the case with Watchkeeper.

9. As stated previously, we would be pleased to brief the Committee in person on these issue if the opportunity arose.

September 2013

Written evidence from the Royal Aeronautical Society

SUMMARY

— The use of "drone" to describe the various types of uninhabited aircraft should be discouraged. Remotely Piloted Air System (RPAS) is a more accurate term.

— All of the current generation of RPAS require considerable human interaction with a man-in-the-loop to exercise judgement and, in the case of Reaper, to release weapons.

— The RAF experience operating RPAS over Afghanistan and elsewhere has highlighted some key lessons. Cooperation with the USAF Reaper programme has allowed us to benefit from economies of scale and shared facilities we would not otherwise have enjoyed. But it has also brought challenges associated with dislocated operations.

[112] Hansard 24 Jan 2013 : Column 1MC

[113] Nick Hopkins, Nearly 450 British military drones lost in Iraq and Afghanistan, *The Guardian*, 12.02.2013, www.theguardian.com/uk/2013/feb/12/450-british-military-drones-lost

— Recent operations have underlined the requirement for training specialised crews to operate unmanned aircraft. The RAF has recently graduated its first class of RPAS pilots and a number of RPAS operators are currently examining the training requirements to operate various classes of unmanned aircraft in future.

— Timescales for emerging technologies cannot be precise. RPASs have the potential to be employed across the full range of airpower roles and platforms can be expected to grow steadily in numbers over the coming decades, including highly sophisticated vehicles operating on the boundaries of space.

— There is widespread legal, academic, media and public concern over RPAS operations to the extent that their legality is questioned in some quarters; the development of international humanitarian law may not be quick enough to keep pace with potential autonomous developments.

— The majority of military sorties are flown for reconnaissance purposes. The minority tasked with weapons delivery are subject to the standard application of the laws of armed conflict and rules of engagement. The primary issue in recent operations has been the extent to which armed sorties have been under the direction of foreign intelligence agencies with different rules of engagement.

— The UK needs to be clear on its own stance. It is necessary for policy makers and commanders to understand where the UK stands on the questions of legality. With the blurring of law and policy, this may be a question the UK Government would rather not have to answer.

— An important factor is the degree to which UK personnel are actively engaged in armed operations, or are complicit in their conduct. This could include the provision of intelligence, active participation, or carrying out other activities which free up capacity for lethal RPAS operations.

Introduction

1. The Royal Aeronautical Society is the learned society for the aerospace and aviation community. It has over 17,000 members world-wide. Its activities are supported by a number of Specialist Groups, including an Air Power and a UAS Group.

Nomenclature

2. This has been the subject of much debate (and some confusion) amongst analysts and in public debate generally. The popular default position has been to adopt the word "drone" to describe the uninhabited (a gender free variant of unmanned) air (or aerospace) vehicle (or system (hence UAV or UAS). This is an echo perhaps of the radio-controlled converted aircraft used for target practice. Drone also has a useful resonance in headlines and popular imagination. The use of the term drone to describe a class of far more sophisticated aircraft is, however misleading and should be avoided.

3. The International Civil Aviation Organisation (ICAO) has described all aircraft without a pilot *on board* as "pilotless". The terms Unmanned Aircraft and Unmanned Aircraft Systems, UAS cover all aircraft fixed, rotary, lighter than air etc., that are pilotless. For the "foreseeable future", only Remotely Piloted Aircraft (RPA), that is UAS that have a human pilot located somewhere (on the ground, on a ship, another aircraft, in space) who is able to control the flight of the aircraft, will be able to operate in non-segregated airspace. ICAO has adopted a very rigid definition of "autonomous" as operation of the aircraft where a human pilot is not able to intervene in the management of the flight. This does not align with the NATO and other "scales" of autonomy, which relate to levels of authority and decision support.

4. The term RPA is not intended to imply that the aircraft is expected to be flown routinely manually or even that it has the potential to be flown manually (use of autopilot, etc, is covered by the term)—the requirement is that the pilot can manipulate the flight controls, as appropriate, during flight. From this it follows that RPA and Remotely Piloted Aircraft Systems (RPAS) (which include the "pilot station" and the command and control infrastructure) are a subclass of Unmanned Aircraft and Unmanned Aircraft Systems respectively.

5. However, this nomenclature is not yet widely adopted, although there is a growing use of the term "RPAS", which the Society will use in this submission.

6. The term UCAS, describes Uninhabited Combat Air Systems—advanced armed platforms currently under development in the US, Europe and elsewhere.

Context

7. The emergence of RPAS platforms is potentially one of the more overtly "transformational" aspects of modern warfare. Although much of the current debate has been centred on their use by the US, the UK and other advanced military powers, access to RPAS technology is increasingly global in extent. RPAS programmes and research are to be found in several centres, many outside the usual aerospace producing countries. The ubiquity of RPAS development and production in itself constitutes an important change factor in the world defence industry and in future military operations.

8. Currently, there are over 30 countries with some form of unmanned programme, with over 7000 platforms in total deployed. Many are small and unsophisticated vehicles, and the ability to develop and to deploy the

more sophisticated surveillance and armed RPAS is more concentrated. But this still has the potential to pose a challenge to established military aerospace producers and has implications for future military operations conducted by the UK and its allies, especially as the technology becomes more ubiquitous.

Current Use

9. The current generation of RPAS began as reconnaissance vehicles. Modern electro-optical sensors, satellite tracking technology and long endurance combined to enable them to remain airborne for long periods while being controlled from great distances and to monitor activity on the ground continuously in real time. The General Atomics MQ-1 Predator, and its immediate predecessor the Gnat, were first employed by the CIA for covert surveillance over the Balkans and Afghanistan in the 1990s.

10. Frustration in Washington at being unable to quickly strike targets of opportunity identified by RPV feeds led to the Predator being armed with Hellfire missiles post 9/11 and they have since become the USA's weapon of choice against militants in Afghanistan and (controversially) Pakistan and elsewhere. Over 30 countries now operate unmanned aerial vehicles, with many developing their own indigenous capabilities. However, the spotlight has remained on the USA because of the size of its inventory and the lethal nature of its RPAS operations.

11. The MQ-9 Reaper, an advanced and more heavily armed version[114] of Predator, is currently the RAF's only RPAS and is being employed over Afghanistan. It can stay airborne for up to 20 hours, has a ceiling of 50,000 feet, and its payloads include electro-optical and infrared sensors in a manoeuvrable turret, and a synthetic aperture radar with moving target indicator. It can be armed with Hellfire missiles and GBU-10 precision guided bombs. The system has multi-role capability and can conduct a wide range of missions from pattern of life surveillance to assisting with anti-IED tasks and precision attack. The RAF currently operates 10 Reapers in two squadrons. They fly from airfields in the theatre but are remotely controlled, via satellite links, by RAF personnel based at Creech AFB Nevada and now at RAF Waddington, UK.

12. Air power is not the sole domain of the RAF. The Army also deploys RPASs in Afghanistan, ranging from the small short range Desert Hawk to the larger Israeli built Hermes 450 for surveillance and artillery target spotting. The Watchkeeper, based on the Hermes, is currently entering service with the Royal Artillery in this role. However, Reaper is presently the only armed UK-operated system. All UK RPASs require considerable human interaction, with a man-in-the-loop to exercise judgement and, in the case of Reaper, to release weapons. Significant numbers of personnel on the ground are required also to exploit the larger systems' outstanding capability as ISR[115] platforms.

13. In the last decade RPASs have progressed from minor players in the intelligence and situational awareness role to a key part of Allied air campaigns over Iraq and Afghanistan, with single platforms capable of achieving the entire find, fix, track, target, engage and assess kill chain. Their development follows a similar path to the evolution of aviation over the battlefields of WW 1, where aircraft began by providing artillery observation, then carrying rudimentary bombs and ended up engaging in major air battles against each other. Early indications are that parallels between the development of manned and unmanned aircraft will not end there; the capabilities of RPASs will continue to develop and they will increasingly play a part in all air power roles.

Lessons Learned from Operations in Afghanistan

14. The RAF experience operating RPASs over Afghanistan and elsewhere has highlighted some key lessons. Cooperation with the USAF Reaper programme has allowed the UK to benefit from economies of scale and shared facilities that the UK would not otherwise have enjoyed. But it has also brought challenges associated with dislocated operations. No. 39 Sqn., the first to operate the Reaper, is based in the USA and UK, and flies near constantly over Afghanistan. As a result the command and control chain is long and complex, with the challenge of balancing the many conflicting demands on this capable platform. Delivering an enduring 24/7 capability has proved to be a strain on Sqn. personnel, who are on operations for three-year tours, rather than the six months for those deployed forward in theatre.

15. There has also proved to be a constant misconception that "drones" are autonomous killing machines, whereas in reality each Reaper is controlled all the time by highly-trained operators bound by the same ROE as manned combat aircraft. There is no artificial intelligence associated with Reaper, only a lower level automation, such as an autopilot. The current need for humans in the loop is dictated by the complexities of attack missions and airspace de-confliction requirements. Remote piloting is expected to remain required for the foreseeable future.

16. Field experience has also highlighted the large number of personnel needed to support RPAS operations. The Reaper squadrons have a complement of 185, over half required for intelligence handling and processing. Experience has also shown that, while RPASs have great utility in complex counter-insurgency operations, they are best employed as part of a mixed force of manned and unmanned aircraft. The flexibility offered by manned aircraft means they will continue to be required for more specialised roles, such as wide area surveillance, for

[114] UK remains one of the few countries to deploy armed RPASs.
[115] Intelligence, surveillance and reconnaissance

some time to come. The present Chief of Air Staff (RAF) is on record as stating that he foresees only one third of RAF aircraft being unmanned in 2030, although the proportion may yet increase as technology and therefore capability develops.

17. RPASs also proved their value over Iraq and in NATO's Operation Unified Protector over Libya in 2011. In the latter case, Italy and France both deployed unmanned aircraft for surveillance, but NATO had to rely primarily on US assets. Armed USAF Predators flew attack missions and Global Hawks provided high altitude bomb damage assessment, particularly in areas where there remained a residual air defence threat. An overriding lesson from the conflict was that RPASs were in great demand and more were required to fulfil all operational missions. Also proving their usefulness over Iraq and Libya were smaller short range RPASs, flying as "eyes in the sky" in support of both ground and naval operations.

18. Recent operations have underlined the requirement for training specialised crews to operate unmanned aircraft. The RAF has recently graduated its first class of RPAS pilots and a number of RPAS operators are currently examining the training requirements to operate various classes of unmanned aircraft in future.

19. Complex operations have underlined the importance of a manned/unmanned mix of aircraft. Wide area surveillance platforms such as the RAF's Sentinel R1 aircraft are important to successful use of RPASs. Short term developments will focus on expanding the ISR capabilities of RPAS platforms.

Tomorrow's Potential—New Capabilities by 2020

20. Timescales for emerging technologies cannot be precise. RPASs have the potential to be employed across the full range of airpower roles. General RPAS and UCASplatforms can be expected to grow steadily in numbers over the coming decades, including highly sophisticated vehicles operating on the boundaries of space. There will be a range of different platforms; practically all will be multi-role and most are likely to be weapons capable. There will have to be increased focus on platform survivability, probably including development of advanced multi-spectral countermeasures as well as stealth technologies.

21. The development of relatively low cost disposable RPASs, with more advanced payloads may also increase the range of roles for the RPAS. Advances in technology can be expected to give RPASs greater persistence and endurance and multi-role utility. A current shortcoming of armed RPASs is their small weapon load, but Directed Energy Weapons (DEW), which could be available as early as 2025, will give much greater attack capability. RPASs will be particularly important for operations in contested airspace with an air defence threat. DEW will enable multiple attacks on ground and air targets, simultaneously if required.

22. Near term developments aimed at shaping the RAF's Future Force 2020 will be invested in expanding networked combat ISTAR[116] and command and control capabilities for both manned and unmanned aircraft. This is highly relevant to increasing RPAS capabilities. While UCAS can be expected to take over many attack missions, control of the air, especially in congested, cluttered and contested airspace, will probably remain the preserve of manned fighter aircraft at least until post 2030.

23. As RPASs proliferate, we can expect costs to come down. There will also be implications for manning and force structures as numbers grow and platforms become more automated. Military forces are already examining future training and skill requirements to operate next generation RPAS. The RAF has already created a new aircrew category—Remotely Piloted Air Systems Pilot. Given increased levels of autonomy, future RPASs may not all require qualified pilots.

24. The RAF's MQ-9 Reapers were acquired hastily under an Urgent Operational Requirement. The UK has since set up two programmes in the last few years to explore new RPV technologies. The MANTIS technology demonstrator is exploring technologies associated with Medium Altitude Long Endurance (MALE) systems, for which there is a joint Anglo-French development contract. BAE Systems' Taranis, which was unveiled in July 2010, is more futuristic, being developed to explore advanced UCAS technologies and roles.

25. The UK is also involved in research to allow coordinated operation in the same airspace by manned and unmanned aircraft. Airspace integration remains one of the great challenges for future RPV operations. The German government has just been forced to cancel the EuroHawk unmanned high altitude SIGINT[117] aircraft programme, valued at over a $1 billion, because certification for it to operate in civilian airspace was unlikely. The successful integration of RPASs into controlled airspace will have a dramatic impact on the RPAS industry, with new markets driving down the cost of the more sophisticated platforms as well as paving the way for a more extensive para-military and civil security role. Both the US and Europe (with ICAO providing coordination at an international level) are evolving rules, regulations and the technology necessary for such an integration of operations.

26. There is much work in this respect underway in the US and Europe. The European Commission having recently published a "road map" on this subject. The Commission and the European Defence Agency also want to coordinate research in this area and have proposed an extensive programme of research in this area, which will be presented to the EU Defence Council in November.

[116] Intelligence, Surveillance, Targeting and Reconnaissance
[117] Signals Intelligence

Legal Considerations

27. There are significant legal and ethical questions over the expanding use of military RPASs, especially as technology enables their operation to become more autonomous. At the simplest of levels it is very easy to assuage concerns over the legality of operating RPASs. They are almost invariably flown over sparsely populated areas in uncontrolled airspace or with individual dispensation. They are seamlessly tasked, operated and deconflicted on routine air tasking orders. Moves to develop a regime for incorporating RPAS into controlled airspace are underway in North America, Europe and elsewhere, but this will require significant technical improvements in key areas such as "see and avoid" capabilities.[118]

28. The majority of military sorties are flown for reconnaissance purposes. And the minority tasked with weapons delivery are subject to the standard application of the laws of armed conflict and rules of engagement. Targets are approved through the same exacting process as used for manned aircraft. The insistence on the use of the term RPASs is designed to reassure the world that these sophisticated weapon systems are not drones acting autonomously (or to simple mechanical algorithms), but the human operator is very much in the loop. Fire orders can therefore be issued after considerable deliberation and the risks of collateral damage are considerably reduced.

29. The reality, however, is that there is still widespread media and public concern over these operations to the extent that their actual legality is questioned. Furthermore, the whole context in which they are used is raising questions about the development of international humanitarian law not being quick enough to keep pace. Domestic concerns over the potential (and actual) use of drones in UK airspace for law enforcement or intelligence gathering raise other doubts over privacy and so forth, but will not be dealt with in this section.

30. The American use of Predator and Reaper systems by both the USAF and the CIA has generated the most angst and it is therefore appropriate to review their formal stance. The United States' position is that it is in an "armed conflict with al-Qaeda, as well as the Taliban and associated forces".[119] This is in response to the 9/11 attacks and constitutes self defence under international law (specifically Article 51 of the UN Charter). Under domestic law Congress authorised the use "of all necessary and appropriate force" through the 2001 Authorization for the Use of Military Force which remains in force.

31. Many US lawyers, academic analysts and officials therefore consider the "drone" operations legal under international and domestic law. Indeed the President has a formal duty to exercise this force against the nation's enemies. A senior State Department legal advisor has underlined the American adherence to the principles of distinction, proportionality and the need to ensure minimal collateral damage.[120] Beyond this, the majority of legal issues raised in the US have been based on lethal operations that have targeted American citizens who have become involved in al-Qaeda.[121]

32. Inevitably, there are numerous objections to this very straightforward interpretation and much ink has been spilt in academic debate; it is not proposed to take this debate beyond highlighting issues that could directly impinge on UK interests. The central point here is the degree to which British forces, policy makers and members of the intelligence community are actively engaged in, or complicit with, US operations. Depending on the interpretation of the law, this could involve participation in war crimes. It is, however, worth pointing out that where the interpretation of the law begins (very rapidly) to blur, the distinction between international law and the Administration's policy also becomes less distinct, to the point where a simplistic rendering of the law has merely served to legitimise (at least in their eyes) a chosen course of action.

33. The major concern is the use of lethal action undertaken by the CIA, rather than the USAF or other armed forces. CIA operations have moved from covert, to deniable to public knowledge.[122] The targeting is specific to each use of force, but remains highly classified. It is claimed that it is based on the imminence of the threat; the nature of the sovereignty of the states involved; and on their willingness and ability to suppress the threat. The delegation of weapons release authority to a civilian organisation, and their operating lethal systems has stretched the definition of "combatant". This is equally true on the enemy side where many insurgents swap from civilian occupations to military operations, which is at odds with the ICRC definition of a combatant as being engaged in a "continuous combat function".[123]

34. Article 51(3) of the UN Charter forbids the targeting of civilians; this in turn is mirrored in the Additional Protocols (especially AP 1) and in the Rome Charter where excessive use of force against civilians could amount to a war crime. While America may be willing and able to dismiss the possibility that its CIA personnel

[118] Military operations normally take place in specially designated "segregated" airspace where civilian traffic is restricted to some extent. Military aircraft operating under Operational Air Traffic (OAT) rules in non segregated airspace (incorrectly called civil airspace) are required to exercise "due regard" and not hazard civil traffic or populations.

[119] Taken from a speech by Harold Hongju Koh, Legal Adviser to the U.S. State Department, delivered to the Annual Meeting of the American Society of International Law, *The Obama Administration and International Law* on 25 March 2010. Available at http://www.state.gov/s/l/releases/remarks/139119.htm accessed 5 August 2013.

[120] Ibid.

[121] Department of Justice White Paper published by NBC News at http://msnbcmedia.msn.com/i/msnbc/sections/news/020413_DOJ_White_Paper.pdf accessed 5 August 2013.

[122] See for example, Jane Mayer, "The Predator at War, What are the risks of the C.I.A.'s covert drone program?" *The New Yorker*, 26 October 2009 available at http://www.newyorker.com./reporting/2009/10/26/091026fa_fact_mayer accessed 6 August 2013.

[123] For a much wider discussion see Ryan J. Vogel, "Drone Warfare and the Law of Armed Conflict" *Denver Journal of International Law and Policy* Vol. 39.1, pp. 101–138.

could be prosecuted as unlawful belligerents, this may not be as easy for personnel of European (or other) nations who either knowingly, or heedless of consequences (recklessly), are involved in such operations (and are potentially subject to the jurisdiction of the ICC). The lack of transparency at all levels is of considerable concern.

35. Although it is very straightforward to ascertain the American position on the conduct of these operations under domestic and international law, the UK needs to be clear on its own stance. Divergence begins immediately with the assertion of being in a state of global armed conflict and follows from there. It is necessary for policy makers and commanders to understand where the UK stands on the questions of legality. With the blurring of law and policy, this may be a question the UK Government would rather not have to answer.

36. The second factor is the degree to which UK personnel are engaged in these operations, or are complicit in their conduct. This could include the provision of intelligence, active participation, or other activities which free up capacity for lethal drone operations. The third factor is the use subsequently made of material gained (including patterns of lifestyle etc) from CIA/USAF drone operations. The final issue worthy of consideration under the legal framework is one of public confidence. In the UK, and in America, adherence to the laws of war by the military is the norm. The training, education and briefing processes are such that even where there are breaches (such as in interrogation procedures) the public is aware of what has been breached. The CIA operations do not offer such confidence.

15 September 2013

Written evidence from Defence Synergia

A DEFENCE & STRATEGY RESEARCH GROUP.
EXPOSING THE INCOHERENCE AND WEAKNESS IN THE UNITED KINGDOM'S DEFENCE AND SECURITY STRATEGIES

1. UK air power in the 21st century must first and foremost respond to and be defined by reference to a UK strategic narrative. This narrative will define the overarching rationale for UK forces and the relationship between those forces and the UK's national interests and security priorities, calling for their use in combined, joint, and multi-national operations.

2. A higher-level statement of national direction is required to provide the basis for formulation of national doctrine so that step-down plans for the employment of national air power resources including unmanned air vehicles can be developed to support the Government's strategic aims.

3. It is the DefenceSynergia (DS) view that these strategic aims and a coherent supporting narrative have yet to be fully articulated. As a result, current and future plans for the employment of UK air power risk being incoherent and uncoordinated. The net effect of this is basically confusion; specifically it highlights the mismatch between the essentially ground-centric aspirations of the National Security Strategy (NSS) and the limitations on national security imposed by the proposed air power order of battle (ORBAT). As it is currently envisaged, this ORBAT will be insufficient and its limitations will have direct impact, by reducing the effectiveness and operational feasibility of military, naval, and diplomatic responses to any threat.

4. Therefore, this DS evidence to the HoC Defence Committee is written to exam the nature and future of unmanned combat, surveillance and carrier launched air systems (UCAV, UCAS, UCLASS). In so doing we look at some inconsistency and gaps in the funded UK air-power ORBAT as measured against NSS expectations. Indeed, we examine current United States Navy (USN) experience into the funding and balance of defence programmes, including UCLASS, and how these are impacted in UK and the United States (US) by the spiralling costs of the F35 Lightning II procurement. We go on to examine some of the operational, technical and diplomatic issues that the advent of unmanned air vehicles may pose. In doing so we touch on whether sufficient attention is being given to developing cohesive doctrine that considers the potential ethical consequences and emerging technological challenges involved.

Main Discussion

5. **Background**. Strategic Defence and Security Review (SDSR) 2010 and the overarching NSS set the Defence Planning Assumptions (DPA) and direction of travel for all UK forces up to the year 2020. The generally accepted view outside of MoD is that the size, scope and capability of the UK armed forces is being dictated by the comprehensive spending review (CSR) process rather than any higher level strategic bench mark. Thus in air power terms we see capability gaps emerging; some, but not all, that might be filled by unmanned air vehicles.

6. **UK Air-power Requirements to meet NSS DPA**. In making its assessment of UK airpower requirements DS has in mind the following statement from the SDSR 2010: "*...This environment will place a premium on particular military capabilities, including intelligence, surveillance, target acquisition and reconnaissance (ISTAR). It will demand sophisticated and resilient communications and protected mobility by land, sea and air. It will also mean that our people must continue to be our winning edge. Therefore, as the NSS also calls*

for UK to 'maintain her world wide role' we note that the NSS direction of travel is for maritime/air focused armed forces with the ability to deploy on expeditionary operations whilst carrying out independent home or overseas tasking."

7. **Unmanned Combat Air Vehicles and Drones**. The advent and use of unmanned combat air vehicles and drones to supplement or replace manned air-power assets is a technological work in progress which does offer advantages in situations where risking the mortality or capture of the pilot/crew could adversely affect an operation. However, whilst limited numbers of various types of UAV are already operated by British forces for reconnaissance and strike the move towards the use of UCAV as a low cost and operationally safer alternative to manned aircraft will be impacted by the available and emerging technology, not least because the development of **Artificial Intelligence (AI)**—essential for autonomous operation—is immature; the uninterrupted bandwidth required for full or partial remote control is problematic and in a cyber-warfare environment not guaranteed to be totally secure. Indeed, as control of unmanned air vehicles is often predicated upon satellite communication system's their vulnerability is increased if the enemy has the ability to disrupt or destroy friendly satellites.

8. **UCAV Aerodynamic Constraints**. A further factor to be considered in the development of UCAV is that the power to weight ratio of all air vehicles is governed by the mathematics of aerodynamic design; eg total payload and range—fuel consumption to deliver a payload over distance—as defined in the "Breguet Range Formula" albeit that there is a positive trade off advantage that UCAV offers in a high "g" environment beyond manned tolerance limits. Therefore, Dr Kopp, in his paper for the UAV Australia's conference, 8 & 9 February 2001 in Melbourne, Australia, tells us that major savings may not accrue by simply replacing manned airframes with UCAV because size and engine performance are crucial factors and the lack of a pilot and life support system offer only marginal fuel (weight) savings.

9. **The Operational & Developmental Implications of UCAV**. Whilst the use of small drones (army Watchkeeper and RN Scan Eagle) and medium sized UCAV (RAF Reaper) is a reality the range, speed and payload characteristics of the current air vehicles restricts their operational use albeit that the sensor data can be transmitted globally and the capability for long duration loiter is an advantage. However, if British air-power doctrine is to develop in the direction of replacing some front line manned fast jets with land or maritime based UCAV this may require far larger (heavier) airframes than are currently operated and considerable further development of **AI** to allow the operational discernment required in modern warfare. The law of armed conflict, ethics and concepts of "war amongst the people" as well as more prosaic issues such as national air traffic restrictions having to be addressed. EG. In accordance with UK Civil Aviation Authority (CAA) guidance paper into unmanned aircraft system operations in UK airspace—CAP722 dated Aug 2012—all military Remotely Piloted Air Systems (RPAS) are to be registered as military aircraft under the auspices of the Military Aviation Authority (MAA) regulatory framework. It goes on to say in chapter 2–3.3: *"Under normal circumstances and **until appropriate national airspace procedures have been promulgated**, flights will only be permitted within MAA approved Danger Areas or segregated airspace. These Danger Areas and segregated airspace must provide adequate radar services (or such processes that are agreed to be considered equivalent) such that the Rules of the Air Regulations requirement for the 'Commander' of the aircraft to avoid aerial collisions can be fully acquitted. This will also generally involve the installation of an approved Flight Termination System (FTS) and Identification Friend or Foe (IFF) system."* **The key issue for the committee here may be to investigate with the CAA and MAA what the appropriate national airspace procedures will be, the effect upon MoD RPAS operations and when they will be promulgated? As these regulations currently refer to RPAS would this definition require adjusting for future autonomous systems?**

10. If the RN ambition is to match US UCAV concepts for carrier borne operations then Catapult and Arrester gear (cats n traps) would have to be reconsidered for the Queen Elizabeth class (QEC). The USN X-47B Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) aircraft which is currently being developed and tested is the size and weight of a large fast jet with considerably more range. [Specifications = 2100 nm range, weight 44,500 lbs with a pay load of circa 4.500 lbs.] As trials in July 2013 aboard the carrier USS George H W Bush have demonstrated this size of air vehicle requires catapult launch and arrested landing capability. Alternatively the RN could opt for a long range land based UAV ISTAR technology such as "Global Hawk" and accept restrictions in range, payload and effectiveness of lower performance UCAV for shipboard operations.

11. **US Congress View of Future Naval Aviation Fixed Wing v UCLASS** The committee may wish to consider the views of future naval air power development offered by J. Randy Forbes, Congressman from Virginia's fourth district, Member of the US House Armed Services Committee and Chairman of the Readiness Subcommittee who has recently said the following in respect of US maritime air-power development:

> *"In my opinion, the great debate in the Navy today is in regards to finding the right balance between quantity and quality, and while that debate is most often taking place in regards to surface warfare specific to ship numbers, it exists in...naval aviation in the form of the future Carrier Air Wing...I strongly believe the F-35C has not only sucked all the innovation out of the carrier based naval aviation community today, but it has sucked all the money out of the naval aviation overall heading into the future."*

Congressman Forbes notes *"it may cost up to $1 billion to accelerate the UCLASS program yet for the F-35C, that's the annual cost increase of a program that has a never ending list of problems specific to promises unlikely to be kept regarding capabilities."*

Congressman Forbes goes on to say: *"I do not know if UCLASS can meet existing objectives for the program in the next 10 years...I do believe however that if the Navy wasn't sinking every last dollar into the F-35C...the Navy would get more mileage with multiple UCLASS programs while holding the CVW line with Super Hornets than the Navy would get with continued investment in the F-35C...(which) ...has passed all cost threshold red lines... but it's entirely possible a cut in the buy of F-35Cs is coming in the next budget simply because the money isn't there to absorb the cost increases any more...It will cost the Navy $44 billion just to build 340 F-35Cs. The Navy could build 12 plane (sic) Super Hornet squadrons for $20.4 billion and take the remaining $24 billion and innovate UCLASS, and save money in maintenance and operations while ending up with more aircraft."*

12. **Some Thoughts on Weapons Platform Types and Numbers**. It seems clear that the future capacity and capability of UK Air-Power assets is under continuous review and that UCAV is now forming an important part of this mix. However, with the MoD wedded to a two fast jet strategy (Typhoon & Tornado to 2019, Typhoon & F35B Lightning II from 2020) deep penetration capability may be gapped. The RAF will effectively reduce to circa 155 of two fast jet types by 2020 with the RN having a significant share of the proposed F35B fleet. What is missing is a Tornado GR4 replacement to meet the RAF operational requirement (OR) for a Deep Penetration Offensive Capability (DPOC), which decision, according to MoD evidence to the NAO in Apr 2013, has been deferred to 2030 and is now being designated as a Typhoon replacement.

13. This DPOC OR is a possible contender for a move in the direction of UCAV. Work is being carried out by BAE Systems with the Strategic Unmanned Air Vehicles (Experiment) Integrated Project Team (SUAV(E) IPT) responsible for auditing and overseeing the "Taranis" project. However, this 18,000 lb (Hawk sized) £143 million development aircraft is due to fly in 2013 and is some way off providing the RAF with certain future stealth DPOC. In the interim, the cost of each F35B Lightning II is now officially acknowledged by the NAO to be circa £90 million, which has necessitated the UK reducing its buy from 138 to 48. The cost of acquiring, arguably limited "stealth" capability, absorbing large chunks of the defence budget affecting, as Congressman Forbes says in a US context, many other programmes.

14. **The Air Power Mix—Critical Mass**. Air Chief Marshal Sir Michael Graydon—a former Chief of the Air Staff—has estimated that with the planned personnel numbers and mix of fast jets (questionably 107 RAF Typhoon and 48 RAF/RN shared F35B) the RAF will be below critical mass and only realistically capable of fielding and maintaining 2 attack squadrons forward of UK main bases on enduring operations. [See UKNDA paper Funding Defence Mar 2013]. This equates to circa 30 Typhoon jets for land based tasking if, as planned, the F35B is dedicated to carrier operations. The DPA requirement being 12 F35B routinely embarked on QEC with the capability to surge to 36 in an emergency—a tall order from a total fleet of only 48 airframes. The total UK deployable air-power post 2020 being a notional 66 fast jets operating forward from land and sea once training, manning and maintenance tasking are included.

15. **ISTAR, Airborne Warning and Control System (AWACS) & Data Exchange in an Expeditionary Age**. In an expeditionary data linked and intelligence hungry age having the AWACS and active command, control, communications, computer and ISTAR (C4ISTAR) data links that provide force extension and multiplier affect is all the more crucial when the combat forces are limited in number. Being able to extend the range, duration, time and battle space management view for the combat assets available (manned and unmanned) increases the utility of the force and helps to maintain critical mass. **Which may encourage the committee to ask these questions:**

(a) As these ISTAR enabled asset and their systems are so important why are the remaining four RAF E-3D Sentry in the forward available fleet flying with steadily outdated communications suites; MoD cancelling an option to buy into the US Block 40/45 "Project Eagle" open system architecture upgrade programme?

(b) Will Sentinel ASTOR be retained or is this capability a candidate for UCAV?

(c) From a UK defence systems stand point why has MoD cancelled its option to upgrade the RN fleet with Cooperative Engagement Capability (CEC)—to be incorporated in the US UCLASS programme and without which the F35B will not be able to maximise its arguably limited defensive potential?

(d) If the MoD insists on a two fast jet fleet strategy where would UCAV fit in to this philosophy? Will the RN wish to buy into a maritime Taranis or US X-47B system? In which case what future plans do MoD have to introduce cats n traps to the QEC?

Conclusion

16. Full utility of British air-power cannot be assessed least alone realised until an overarching national strategic vision provides the doctrinal basis for raising, maintaining and funding the British forces in peacetime to meet their collective roles in furthering UK interests and security. Without this clarity MoD is in the position of having to shuffle ever decreasing funding between developing technology and legacy programmes with no clear understanding of what they are being tasked to achieve, when, where and why?

17. Despite the SDSR and NSS grandly discussing the character of future conflict, in the process pointing the armed forces in the direction of expeditionary maritime and air-power enabled operations—ever more reliance placed upon data links and ISTAR capability—some of these enablers are being allowed to wither on the vine. Whilst the NSS acknowledges that the future battle space will be more complex, especially in identifying neutrals, non-combatants and friends from foe, requiring a sophisticated response—CEC, Project Eagle, Sentinel (ASTOR) and LRMPA—that provide force multipliers are being neglected or cancelled.

18. The reality for British air-power in 2020 is that RAF and RN assets are reducing in numbers and improved capability is either insufficient to fill the gaps or an illusion. Indeed, so little attention has been paid to strategy it is highly unlikely that MoD can say exactly what air-power (manned or unmanned) meets UK's needs. This problem is exacerbated by the MoD's rigid adherence to its two fast jet fleet policy which in effect means that any new airframe (manned or unmanned) can only be introduced by way of an offset (retirement) of another fleet and each time the numbers in service fall as cost rise and critical mass is undermined.

19. Given all the above the committee may wish to consider these questions in relation to UCAV:

(a) With only 48 range, agility and payload restricted F35B how will MoD meet the requirement to defend the carrier group with only 12 routinely embarked on QEC without the force multiplier that CEC capability offers (US UCLASS, F18 and F35B/C to be so enabled)?

(b) As Tornado GR4 is not to be replaced (2019) to fill the RAF OR for DPOC will UCAV be employed in lieu?

(c) Is a notional combat ready deployable fleet of 30 Typhoon and 36 F35b Lightning II sufficient to meet the DPA without—notwithstanding the MoD two fast jet fleet policy—being supplemented by UCAV?

(d) Do the RN intend to deploy an X-47B size UCAV at sea (full carrier ops)? If so what research is MoD undertaking into retrofitting cats n traps to QEC?

(e) To what extent is the future of UCAV in UK dependent upon the development of Artificial Intelligence? What are the legal and diplomatic implications for UK of operating fully autonomous UCAV as opposed to RPAS?

(f) What CAA/MAA agreement has been reached in respect of RPAS/UCAV national airspace procedures being promulgated. How will these regulations impact future intercontinental enabled (armed or unarmed) unmanned air systems operating from UK air bases?

23 July 2013

Abbreviations

Note: For clarity and assistance to the committee—we offer below a list of commonly used abbreviations.

UAV Unmanned Air Vehicle

UCAS Unmanned Combat Air System

J-UCAS Joint Unmanned Air Systems (Joint USN/USAF Project)

N-UCAS (USN Project)

LMAMS Lethal Miniature Aerial Munition System Small-armed-hand launched drone

UCAV Unmanned Combat Air Vehicle

UCLASS Unmanned Carrier-Launched Surveillance and Strike (X-47B)

RPAS Remote Piloted Air System RAF designation

Other Abbreviations:

ISTAR Intelligence Surveillance Target Acquisition and Reconnaissance

C4ISTAR Command, Control, Communications, Computer and ISTAR

ORBAT Order Of Battle

NSS National Security Strategy

DPOC Deep Penetration Offensive Capability

AWACS Airborne Warning and Control System

ASTOR Airborne STand-Off Radar

LRMPA Long Range Maritime Patrol Aircraft

CEC Cooperative Engagement Capability

CAA Civil Aviation Authority

MAA Military Aviation Authority

UKNDA United Kingdom National Defence Association

DS Defence Synergia

Written evidence from Research Councils UK (RCUK)

1. Research Councils UK is a strategic partnership set up to champion research supported by the seven UK Research Councils. RCUK was established in 2002 to enable the Councils to work together more effectively to enhance the overall impact and effectiveness of their research, training and innovation activities, contributing to the delivery of the Government's objectives for science and innovation. Further details are available at www.rcuk.ac.uk

2. This evidence is submitted by RCUK and represents its independent views. It does not include, or necessarily reflect the views of the Knowledge and Innovation Group in the Department for Business, Innovation and Skills (BIS). The submission is made on behalf of the following Councils:

- Engineering and Physical Sciences Research Council (EPSRC).
- Economic and Social Research Council (ESRC).
- Natural Environment Research Council (NERC).

3. NERC contributions primarily from British Antarctic Survey (BAS) and NERC National Centre for Atmospheric Science (NCAS).

Nomenclature—Defining the Terms RPAS, UAS and "Drone"; More than just a Flying Drone

4. "Drone" is a term often associated with 1960s, and earlier, platforms or their use in military applications.The most commonly used term for their use in scientific research and other civil applications is UAS or unmanned aerial systems. Remote piloted aerial systems (RPAS) and unmanned aerial vehicles (UAVs) are also accepted terms.

5. These can be remotely piloted from the ground and/or operate autonomously and have a number of potential scientific applications (see response to question 2).

6. Autonomous and intelligent systems which are capable of independent/semi-independent action in dynamic, unpredictable environments are a challenge in a number of scenarios. A proportion of industrial applications uphold a human in loop model of working, where machines are becoming more integrated and automated. Some relevant areas[124] of research are:

- software architectures;
- sensor exploitation;
- situational awareness;
- use in battle and other contested spaces;
- operational efficacy;
- decision making and planning;
- information management;
- verification of autonomous systems; and
- model building and learning.

Current Utility and Dispersal—For what purposes are RPAS used Currently?

7. Within the science community they are used for a number of applications including species surveys, terrain mapping and geophysics surveys with researchers working on applications in areas such as remote inspection in hostile environments, autonomous driving, defence, logistics, security, and environmental research (eg atmospheric and climate studies).

8. Unmanned aerial vehicles (UAVs) have important future roles to play in the support of civil contingency events such as industrial accidents, natural hazards such as earthquakes and volcanos and CBRN-related events.

9. The advantages of UAVs can relate to their endurance, ability to enter hazardous environments and perform repetitive activities with high precision. UAVs in themselves provide only the platform for supporting civil and defense sensing activities; they are simply the means by which instruments and sensors may be brought in to theatre.

10. The British Antarctic Survey (BAS) uses UAVs during the Antarctic winter to acquire meteorological data and undertake ice flux measurements over sea ice. Unmanned quadrocopters are used for species measurements on seals and penguins.

11. NERC is currently supporting a major research programme to examine upper atmospheric interactions in a collaborative project using the Northrop Grumman created NASA Global Hawk UAV platform. This programme is enabling UK participation in high impact UAV enabled science, through collaboration with NASA partners. The programme is studying the chemical and physical properties of the tropical tropopause

[124] Please see appendices for further information on the EPSRC definitions of these (Table 1)

layer (TTL) and the impacts of the TTL in controlling the composition of the upper troposphere and lower stratosphere[125].

12. UAVs have ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance) applications in battle and other contested spaces. This contributes to situational awareness.

13. Where offensive operations are concerned, UCAVs (Unmanned Combat Aerial Vehicles), such as Predators and Reapers are deployed and used.

Lessons Learned from Operations in Afghanistan

14. No response from RCUK, though Professor Wheeler's Project will cover this area in its plan of work (see para 43).

Tomorrow's Potential—What Additional Capabilities will the UK Seek to Develop from now to 2020?

15. The Research Councils have provided support for a balanced community by creating a number of opportunities for a healthy research base in this area of research that has encouraged academic excellence, collaboration with industry, training for future leaders and responsible innovation by those working in the field.

16. The development of instrumentation for UAVs is a complex and challenging activity, requiring substantial reductions in mass and power consumption in parallel to greater autonomy over, for example, hand portable or manned aircraft-mounted sensors. The specialised nature of such devices has for many applications resulted in the platform UAV capability running some considerable way ahead of sensors themselves.

17. Autonomous and intelligent systems represent a key potential growth area for UK industry. The Research Councils are committed to understanding the research and training needs of industry and connecting industry and academia to ensure maximum impact from the research we fund.

18. The development of greater payload and endurance platforms and enhanced platform sensors are of key interest for future development.

19. UAVs have a role in environmental research as part of an integrated approach to remote sensing and Earth Observation that also includes space based observations. This was highlighted at a recent Challenge Workshop held by the UKSA Centre for Earth Observation Instrumentation.[126]

20. EPSRC focuses efforts on nationally important industrial sectors; of particular relevance in this area are the Aerospace, Defense and Marine sector and the Electronics, Communications and IT sector. EPSRC currently supports a portfolio of approximately £22.1 million of research directly relevant to Unmanned Air Vehicles.

Examples of the key activities supported by EPSRC are given below.

Autonomous and Intelligent Systems Academic Network

21. EPSRC partnered with BAE Systems, Schlumberger, National Nuclear Laboratory (NNL), Sellafield Ltd, Network Rail, SCISYS, DSTL and the UK Space Agency to fund robotics research and the development of intelligent autonomous systems, such as unmanned aircraft, which are vital to many major UK companies, emerging industries, and SMEs, from advanced manufacturing to oil and gas exploration, nuclear energy to railways and automotive, healthcare to defense.

22. The £16 million partnership between the government and industry has helped to bring together virtual network for Autonomous and Intelligent Systems concepts and research in the UK known for its academic excellence, industrial teaming and exploitation. It has created a broad cross-sector community in understanding intelligent systems technology and the broad challenges that are shared across the different sectors. The partnership has created a dynamic and collaborative model between industry and academia with the promise of real exploitation in the near future. The funded proposals include research into safe ways of monitoring in dangerous environments such as deep sea installations and nuclear power plants; "nursebots" that assist patients in hospitals, and aerial vehicles that can monitor national borders or detect pollution.

23. Examples of the funded projects:[127]

24. *Accessing Hazardous Environments:* The University of Oxford will explore how multi-unmanned vehicles can be coordinated to act together to perform different tasks and intelligently navigate without access to aids like GPS. This work can have applications in areas such as remote inspection in hostile environments, autonomous urban driving, defense, logistics, security and space robotics.

[125] See http://www.nerc.ac.uk/research/programmes/tropopause/ and http://www.nerc.ac.uk/press/releases/2013/02-airborne.asp

[126] http://www.ceoi.ac.uk/index.php?option=com_content&view=article&id=109:future-platforms-for-eo&catid=10:latest&Itemid=5

[127] Full details of the projects funded from this call can be found here http://gow.epsrc.ac.uk/NGBOViewPanelROL.aspx?PanelId=1–25869652&RankingListId=1-FEH5L

25. *Improving Human autonomous systems interaction:* The University of Bath is to test different models of information gathering, communication and decision-making between humans and autonomous systems with the aim of improving reaction speed, safety and reliability.

26. *The Self-drive submarine:* Kings College London plan to demonstrate how Autonomous Underwater Vehicles (AUVs), performing inspection and investigation missions, can cooperate and pool information to achieve success when communications are intermittent and external control restricted, this could apply to space or other hostile environments. The team will focus on finding ways to address uncertainty and changing conditions, how plans can be modified and how sensor data is perceived and interpreted. The questions relate to platforms in the airborne environment and this section which relates to marine vehicles may not be relevant.

27. *Improving automated, intelligent maintenance:* Cranfield University extends research in novel sensing, e-maintenance systems, and decision-making strategies. The integration of sensor-based information in geographically dispersed and less structured environments poses challenges in technology and cost justification which will be addressed for rail, aerospace and industrial applications.

Centres for Doctoral Training

28. EPSRC aims to deliver "a balanced skills portfolio to avoid systemic skills shortages in the UK and increase the satisfaction of both students and their employers."[128] Centres for Doctoral Training (CDTs) are one of the three main ways by which EPSRC provides support for Doctoral Training. Quality (of student, training and research environment) is our first priority and is in addition to academic excellence which is a prerequisite. The new round of centres, where we expect to invest £350 million are currently in the process of being assessed and are due to be announced in December 2013.

29. These flagship investments create Centres that train up to five cohorts of 10 or more students over a period of up to eight years and are a key part of EPSRC's strategy for supporting the next generation of scientists and engineers. One of the priority areas chosen is Autonomous Systems and Robotics. This priority area covers training in fundamental skills underpinning the requirements of the autonomous systems and robotics industrial and research capability, and the development of platform combinations of sub disciplines to create flexible self-functioning systems.

30. Highly skilled researchers are required to maximise the wide ranging UK strengths & future opportunities of this area, which include surgical and service robotics, manufacturing and the broad applications of autonomous systems within leading UK sectors such as automotive, oil and gas and aerospace and defence. Proposals should include a cross -sector approach with training in underpinning aspects of autonomous systems research spanning the breadth of Engineering and ICT. Links to users and clients should be tangible & relevant and not confined to a single sector. Centre based cohort training is essential to develop deep fundamental knowledge of individual aspects of autonomous systems, consider ethical implications and their application to catalyze vital cross sector advancement in the field.

Capital for Great Technologies, Robotics and Autonomous systems

31. The Chancellor of the Exchequer announced additional capital funding for the eight great technologies in the pre-budget statement. The EPSRC has invested the £25 million funding it received to strengthen research capability by supporting requests for capital equipment in the area of Robotics and Autonomous systems research. The main objectives of the call were to:

- Strategically grow the research base in this area for the UK's benefit, focussed on areas of strength or areas where the UK has the potential to lead.
- Deliver advanced technology with the potential for translation and take-up.
- Enable talented people access to state of the art equipment.

32. The £25 million awarded to 10 UK Universities by EPSRC attracted additional funding contributions of £8.4 million from higher education institutions and £6 million from industrial partners.[129]

33. NERC is investing £10 million for research and technology development of marine autonomous robotics. The UK has a strong track record in development of autonomous underwater vehicles. NERC, particularly through its National Oceanography Centre (NOC), has over several decades led the world in use of autonomous technologies in the exploration of our oceans, which poses significant technical challenges whilst offering enormous scientific opportunity.

34. Marine autonomous robotic vehicles also pave the way for the development of new UK industries like offshore carbon capture and storage, where in situ monitoring of storage sites in the North Sea will need high levels of technical assurance and innovation.[130]

[128] See EPSRC Strategic Plan 2010: http://www.epsrc.ac.uk/SiteCollectionDocuments/Publications/corporate/EPSRC_strategic_plan_2010.pdf
[129] http://www.epsrc.ac.uk/newsevents/news/2013/Pages/85million.aspx
[130] http://www.nerc.ac.uk/press/briefings/2013/03-investment.asp

ORCHID

35. Researchers at the universities of Southampton, Oxford and Nottingham have been awarded £5.5 million in EPSRC funding to establish the ORCHID programme. The ORCHID programme aims to develop a detailed understanding of the collaborative relationships that can be formed between humans and computational agents and ensure that these "human-agent collectives" are able to operate in a robust, reliable and trustworthy manner.

36. The ORCHID team are working with a number of industrial partners to apply their findings to a range of real-world applications, including the development of a disaster response system that is designed to bring together unmanned autonomous vehicles and first responders.

Summer school

37. EPSRC support has contributed to Cambridge hosting an international summer school on Human-Robot Interaction (HRI) in August 2013. The summer school brought together students and early career researchers with internationally recognised experts in the emerging field of HRI from academia and industry. HRI research offers the potential to improve the capability of unmanned autonomous systems by developing new and improved control mechanisms. For example, EPSRC-funded researchers at the University of Bath are investigating new technologies to support collective decision making between humans and autonomous agents.

Special Interest Group in Robotics and Autonomous Systems

38. This Special Interest Group in Robotics and Autonomous Systems (RAS SIG) has been established to support the development of a new industrial RAS sector in the UK in order to realise increased productivity and growth. Members include BIS, the Technology Strategy Board and EPSRC.

39. Currently much of the required capability in this area is fragmented across universities and companies, and across market sectors, though it is world-class in many aspects. The SIG will support the development of such a community, using existing Knowledge Transfer Network infrastructure to enable the relevant knowledge to be shared more readily. The RAS SIG will develop a strategy for Robotics and Automated Systems that will identify UK resources and capabilities to respond to market drivers with the specific aim of creating jobs and wealth, promoting public understanding of the role that RAS can play in growing the UK economy and in meeting societal needs.

Constraints on the use of RPAS in the UK and Overseas

40. In the UK, operating in controlled airspace is a problem. In Antarctica these constraints do not exist. For science, the term UAS is most appropriate as the unmanned platform is not effective without the requisite sensors. The combination of sensors and platforms is most important.

41. The costs and timescales for development for CBRN sensors for UAVs are potentially very high; however such devices share many common technologies with environmental sensors. Environmental science has been an early adopter of UAV technologies, and many devices being developed for environmental UAV sensing have potential dual-uses in a defence context, although the exchange of innovation between these sectors is less than perfect. Accepting limitations imposed by security, substantial gains can be made by improving the flow of technological knowledge for UAV sensing between sectors and a greater appreciation of common requirements. Sharing of this kind is now beginning—for example NERC's National Centre for Atmospheric Science and the University of York are working with AWE plc. on mapping environmental airborne sensing capability to support national security applications.

42. The UK has a dynamic instrument development sector, both commercial and with the University base. A barrier however to the acceleration of new UAV-borne sensors, and by extension application of UAVs in new roles, has been a lack of accessible large UAV test-bed facilities within the UK. The national position would be greatly enhanced through the provision of a shared development and test UAV platform for new sensor technologies, for not only defence and environmental sectors but also potentially in areas such as communications, precision agriculture and aviation research.

43. In terms of political constraints, the ESRC has funded Professor Nick Wheeler, Birmingham University, to pursue a project on The Political Effects of Unmanned Aerial Vehicles on Conflict and Co-operation within and between States. The primary objective of the project is two-fold: first, to contribute to building the evidentiary base for informed policy making on the use of US/UK drones in overseas theatres of operation. Second, to explore how far different values, belief systems, narratives, and historical contexts lead to radically different interpretations of whether US/UK drone strikes are increasing or decreasing the security of both the intervening and targeted actors. To this end the project addresses the research question of whether the use of drones by a state on the territory of another actor increases or decreases the propensities for conflict and cooperation both within and between those actors. The project started in September 2013.

Ethical and Legal Issues Arising from the use of RPAS

Principles of Robotics: regulating robots in the real world[131]

44. In September 2010, experts drawn from industry, technology, the arts, law and social sciences met at the joint EPSRC and AHRC Robotics Retreat to discuss robotics, its applications in the real world and the huge amount of promise it offers to benefit society.

45. Robots have left the research lab and are now in use all over the globe, in homes and in industry. We expect robots in the short, medium and long term to impact our lives at home, our experience in institutions, our national and our global economy, and possibly our global security.

46. However, the realities of robotics are still relatively little known to the public where science fiction and media images of robots have dominated. One of the aims of the meeting was to explore what steps should be taken to ensure that robotics research engages with the public to ensure this technology is integrated into our society to the maximum benefit of all of its citizens. As with all technological innovation, we need to try to ensure that robots are introduced from the beginning in a way that is likely to engage public trust and confidence; maximise the gains for the public and commerce; and proactively head off any potential unintended consequences.

47. The rules for real robots, in real life, must be transformed into rules advising those who design, sell and use robots about how they should act. The meeting delegates devised such a set of "rules" with the aim of provoking a wider, more open discussion of the issues. They highlight the general principles of concern expressed by the Group with the intent that they could inform designers and users of robots in specific situations. These new rules for robotics (not robots) are outlined below please see the appendices for Tables 2 and 3.

48. The five ethical rules for robotics are intended as a living document. They are not intended as hard-and-fast laws, but rather to inform debate and for future reference. Obviously a great deal of thinking has been done around these issues and this document does not seek to undermine any of that work but to serve as a focal point for useful discussion.

49. Professor Wheeler's project will look at these issues with regard to Afghanistan, Pakistan, Yemen and Somalia. Of particular importance here are considerations relating to International Humanitarian Law, International Human Rights Law and, where applicable, US Domestic Law. This is particularly contested with regard to intervention under the former. There are also legal questions on intelligence sharing which the project will cover.

Trusted Autonomous Systems Fellowship, Professor AR Lomuscio

50. EPSRC funded Leadership Fellow Professor AR Lomuscio, Imperial College London, to develop the scientific and engineering underpinnings for autonomous systems (AS) to become part of our every-day's life. To achieve this Professor Lomuscio is researching the formulation of logic-based languages for the principled specification of AS, the development of efficient model checking techniques, the construction and open source release of a state-of-the-art model checker for autonomous systems to be used for use-cases certifications and the validation of these techniques in three key areas of immediate and mid-term societal importance: autonomous vehicles, services, and e-health. This fellowship intends to pursue novel techniques in computational logic to answer the technical challenges above. A success in these areas will open the way for the verification of AS, thereby opening the way to their certification for mainstream use in society.

Responsible innovation project

51. The increasing use and capability of autonomous systems, raises complex ethical issues for researchers. An EPSRC-funded research network led by the Oxford e-Research Centre aims to raise the profile of ethical issues within the academic research base by bringing researchers together to discuss ethical challenges and possible responses. In addition to raising awareness, the network aims to develop recommendations and ensure that best practice is disseminated to researchers.

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[131] http://www.epsrc.ac.uk/research/ourportfolio/themes/engineering/activities/Pages/principlesofrobotics.aspx

APPENDICES

Table 1

EPSRC-SPECIFIC RESEARCH INTERESTS IN AUTONOMOUS AND INTELLIGENT SYSTEMS

1.0 Software Architectures	This area of research addresses software architectures for housing intelligent autonomous systems software. Software architectures are essential for organising the component software functions that form an autonomous system. A good architectural approach offers modularity, traceability, certifiability and robustness.
2.0 Sensor Exploitation	Autonomous systems are data driven and rely on stored and/or sensed data to create plans and make decisions. Effective exploitation of sensor and stored data improves the performance of an autonomous system through inferring useful information from potentially large volumes of sensor data.
3.0 Situational Awareness and Information Abstraction	Autonomous systems have to create an internal model (world model) of the external environment if they are to simulate a degree of human awareness. Autonomous systems also need awareness of their own current internal state and predicted future state, so that their own capabilities and limitations are understood. This should help to make systems more robust to failures and capable of self-sustainment A combination of information inferred from real-time sensor data feeds together with stored or communicated reference information provides means, through reasoning, to raise the abstraction level to provide inferred contextualisation and beliefs to inform planning and decision making processes.
4.0 Planning	Processes, algorithms and tools for creating, maintaining and metricating plans. Plan formats in this sense are generic, and could be seen as a set of simple instructions or steps for a machine to follow. Plans may be expressed at varying levels, including at the level of high-level goals which inform detailed planning within the autonomous system.
5.0 Trusted Decision Making and Human Machine Interaction	Methods techniques and algorithms for machine decision making, and human interaction with the decision making system. Solutions should consider varying degrees of software integrity levels in the chosen solution.
6.0 Information Management	Intelligent methods of managing information transfer from an autonomous system, including managing bandwidth, prioritising communications and observing operating constraints. Optimising transfer of information.
7.0 Verification and Validation of Autonomous Systems	Autonomous systems can be non-deterministic and existing methods of testing systems software may not provide sufficient evidence to support certification. New techniques for the verification and validation of complex decision making and planning software are needed.
8.0 Model Building and Learning	Autonomous systems will carry out their activities by reference to governing reference models of various types, which will place hard and soft constraints on the operation of the system, as well as more general guidance. Over time, such reference models need to be developed and adapt to new external influences and to learning about effective operation

Table 2

PRINCIPLES FOR DESIGNERS, BUILDERS AND USERS OF ROBOTS

Note: The rules are presented in a semi-legal version; a more loose, but easier to express, version that captures the sense for a non-specialist audience and a commentary of the issues being addressed and why the rule is important.

	Legal	*General audience*	*Commentary*
1	Robots are multi-use tools. Robots should not be designed solely or primarily to kill or harm humans, except in the interests of national security.	Robots should not be designed as weapons, except for national security reasons.	Tools have more than one use. We allow guns to be designed which farmers use to kill pests and vermin but killing human beings with them (outside warfare) is clearly wrong. Knives can be used to spread butter or to stab people. In most societies, neither guns nor knives are banned but controls may be imposed if necessary (eg gun laws) to secure public safety. Robots also have multiple uses. Although a creative end-user could probably use any robot for violent ends, just as with a blunt instrument, we are saying that robots should never be **designed** solely or even principally, to be used as weapons with deadly or other offensive capability. This law, if adopted, limits the commercial capacities of robots, but we view it as an essential principle for their acceptance as safe in civil society.
2	Humans, not robots, are responsible agents. Robots should be designed & operated as far as is practicable to comply with existing laws & fundamental rights & freedoms, including privacy.	Robots should be designed and operated to comply with existing law, including privacy.	We **can** make sure that robot actions are designed to obey the **laws** humans have made. There are two important points here. First, of course no one is likely deliberately set out to build a robot which breaks the law. But designers are not lawyers and need to be reminded that building robots which do their tasks as well as possible will sometimes need to be balanced against protective laws and accepted human rights standards. Privacy is a particularly difficult issue, which is why it is mentioned. For example, a robot used in the care of a vulnerable individual may well be usefully designed to collect information about that person 24/7 and transmit it to hospitals for medical purposes. But the benefit of this must be balanced against that person's right to privacy and to control their own life eg refusing treatment. Data collected should only be kept for a limited time; again the law puts certain safeguards in place. Robot designers have to think about how laws like these can be respected during the design process (eg by providing off-switches). Secondly, this law is designed to make it clear that robots are just tools, designed to achieve goals and desires that **humans** specify. Users and owners have responsibilities as well as designers and manufacturers. Sometimes it is up to designers to think ahead because robots may have the ability to learn and adapt their behaviour. But users may also make robots do things their designers did not foresee. Sometimes it is the owner's job to supervise the user (eg if a parent bought a robot to play with a child). But if a robot's actions do turn out to break the law, it will always be the responsibility, legal and moral, of one or more human beings, not of the robot (We consider how to find out who is responsible in law 5, below).

	Legal	*General audience*	*Commentary*
3	Robots are products. They should be designed using processes which assure their safety and security.	Robots are products: as with other products, they should be designed to be safe and secure.	Robots are simply not people. They are pieces of technology their owners may certainly want to protect (just as we have alarms for our houses and cars, and security guards for our factories) but we will always value human safety over that of machines. Our principle aim here, was to make sure that the safety and security of robots in society would be assured, so that people can trust and have confidence in them. This is not a new problem in technology. We already have rules and processes that guarantee that, eg household appliances and children's toys are safe to buy and use. There are well worked out existing consumer safety regimes to assure this: eg industry kite-marks, British and international standards, testing methodologies for software to make sure the bugs are out, etc. We are also aware that the public knows that software and computers can be "hacked" by outsiders, and processes also need to be developed to show that robots are secure as far as possible from such attacks. We think that such rules, standards and tests should be publicly adopted or developed for the robotics industry as soon as possible to assure the public that every safeguard has been taken before a robot is ever released to market. Such a process will also clarify for industry exactly what they have to do. This still leaves a debate open about how far those who own or operate robots should be allowed to protect them from eg theft or vandalism, say by built-in taser shocks. The group chose to delete a phrase that had ensured the right of manufacturers or owners to include "self-defence" capability into a robot. In other words we do not think a robot should ever be "armed" to protect itself. This actually goes further than existing law, where the general question would be whether the owner of the appliance had committed a criminal act like assault without reasonable excuse.

	Legal	*General audience*	*Commentary*
4	Robots are manufactured artefacts. They should not be designed in a deceptive way to exploit vulnerable users; instead their machine nature should be transparent.	Robots are manufactured artefacts: the illusion of emotions and intent should not be used to exploit vulnerable users.	One of the great promises of robotics is that robot toys may give pleasure, comfort and even a form of companionship to people who are not able to care for pets, whether due to rules of their homes, physical capacity, time or money. However, once a user becomes attached to such a toy, it would be possible for manufacturers to claim the robot has needs or desires that could unfairly cost the owners or their families more money. The legal version of this rule was designed to say that although it is permissible and even sometimes desirable for a robot to sometimes give the impression of real intelligence, anyone who owns or interacts with a robot should be able to find out what it really is and perhaps what it was really manufactured to do. Robot intelligence is artificial, and we thought that the best way to protect consumers was to remind them of that by guaranteeing a way for them to "lift the curtain" (to use the metaphor from The Wizard of Oz). This was the most difficult law to express clearly and we spent a great deal of time debating the phrasing used. Achieving it in practice will need still more thought. Should all robots have visible bar-codes or similar? Should the user or owner (eg a parent who buys a robot for a child) always be able to look up a database or register where the robot's functionality is specified? See also rule 5 below.
5	The person with legal responsibility for a robot should be attributed.	It should be possible to find out who is responsible for any robot.	In this rule we try to provide a practical framework for what all the rules above already implicitly depend on: a robot is never legally responsible for anything. It is a tool. If it malfunctions and causes damage, a human will be to blame. Finding out who the responsible person is may not however be easy. In the UK, a register of who is responsible for a car (the "registered keeper") is held by DVLA; by contrast no one needs to register as the official owner of a dog or cat. We felt the first model was more appropriate for robots, as there will be an interest not just to stop a robot whose actions are causing harm, but people affected may also wish to seek financial compensation from the person responsible. Responsibility might be practically addressed in a number of ways. For example, one way forward would be a licence and register (just as there is for cars) that records who is responsible for any robot. This might apply to all or only operate where that ownership is not obvious (eg for a robot that might roam outside a house or operate in a public institution such as a school or hospital). Alternately, every robot could be released with a searchable on-line licence which records the name of the designer/manufacturer and the responsible human who acquired it (such a licence could also specify the details we talked about in rule 4 above). There is clearly more debate and consultation required. Importantly, it should still remain possible for legal liability to be shared or transferred eg both designer and user might share fault where a robot malfunctions during use due to a mixture of design problems and user modifications. In such

Legal	*General audience*	*Commentary*
		circumstances, legal rules already exist to allocate liability (although we might wish to clarify these, or require insurance). But a register would always allow an aggrieved person a place to start, by finding out who was, on first principles, responsible for the robot in question.

Table 3

SEVEN HIGH-LEVEL MESSAGES

In addition to the above principles the group also developed an overarching set of messages designed to encourage responsibility within the robotics research and industrial community, and thereby gain trust in the work it does. The spirit of responsible innovation is, for the most part, already out there but we felt it worthwhile to make this explicit. The following commentary explains the principles.

	Principle	*Commentary*
1	We believe robots have the potential to provide immense positive impact to society. We want to encourage responsible robot research.	This was originally the "0th" rule, which we came up with midway through. But we want to emphasize that the entire point of this exercise is positive, though some of the rules can be seen as negative, restricting or even fear-mongering. We think fear-mongering has already happened, and further that there are legitimate concerns about the use of robots. We think the work here is the best way to ensure the potential of robotics for all is realised while avoiding the pitfalls.
2	Bad practice hurts us all.	It's easy to overlook the work of people who seem determined to be extremist or irresponsible, but doing this could easily put us in the position that GM scientists are in now, where nothing they say in the press has any consequence. We need to engage with the public and take responsibility for our public image.
3	Addressing obvious public concerns will help us all make progress.	The previous note applies also to concerns raised by the general public and science fiction writers, not only our colleagues.
4	It is important to demonstrate that we, as roboticists, are committed to the best possible standards of practice.	as above
5	To understand the context and consequences of our research we should work with experts from other disciplines including: social sciences, law, philosophy and the arts.	We should understand how others perceive our work, what the legal and social consequences of our work may be. We must figure out how to best integrate our robots into the social, legal and cultural framework of our society. We need to figure out how to engage in conversation about the real abilities of our research with people from a variety of cultural backgrounds who will be looking at our work with a wide range of assumptions, myths and narratives behind them.
6	We should consider the ethics of transparency: are there limits to what should be openly available	This point was illustrated by an interesting discussion about open-source software and operating systems in the context where the systems that can exploit this software have the additional capacities that robots have. What do you get when you give "script kiddies" robots? We were all very much in favour of the open source movement, but we think we should get help thinking about this particular issue and the broader issues around open science generally.
7	When we see erroneous accounts in the press, we commit to take the time to contact the reporting journalists.	Many people are frustrated when they see outrageous claims in the press. But in fact science reporters do not really want to be made fools of, and in general such claims can be corrected and sources discredited by a quiet & simple word to the reporters on the byline. A campaign like this was already run successfully once in the late 1990s.

Written evidence from the All Party Parliamentary Group on drones (APPG)

Introduction

1. This submission focuses on the following issues:

(a) A lack of transparency and accountability about the use of drones by the UK Government particularly in relation to:

— the poor recording of the status and numbers of those killed and injured in drone strikes;

— the limited consideration of the psychological impact of drones on operators and those living in affected areas;

— the broader relationship between the achievement of the UK's military and diplomatic objectives and drone use.

(b) Concerns about the shape of the US-UK relationship and drone warfare with particular reference to:

— Operation of US drones from UK soil;

— Citizenship stripping.

Background

2. The All Party Parliamentary Group on drones (APPG) was established in October 2012.[132] The aim of the Group is to examine the use of drones (unmanned aerial vehicles, UAVs) by governments, for domestic and international, military and civilian purposes. The Group uses Parliamentary processes to facilitate greater transparency and accountability on the development, deployment and use of drones. Parliamentarians have an important role to play in shaping and developing the policy on the use of this weapon, domestically and internationally, and in the application of relevant scrutiny.

3. The level of Parliamentary interest in drones is steadily increasing. To date, there have been four debates in Parliament on drones: two Westminster Hall debates on 6 November 2012 and 11 December 2012 (at the latter, the Minister for Defence Equipment, Support and Technology acknowledged that the debate demonstrated "the increasing interest among not only Members of the House but the public at large about the use of unmanned aerial vehicles"[133]); a House of Commons Adjournment debate on 17 June 2013; and a House of Lords question for Short Debate on 25 June 2013. Since January 2012, Parliamentarians have asked approximately 270 Parliamentary questions on unmanned aerial vehicles.[134]

4. It should be made clear that the APPG is not opposed to drones. There is recognition, by the Group, of the value offered by drone technology, when used in compliance with domestic and international human rights law, and international humanitarian law. However, the Group is concerned that this technology is now outpacing the relevant legal frameworks and that States are failing to pay due regard to their international legal obligations, for example, in legitimising extra-judicial killings. This is a new generation of technology which, it appears, is presenting a substantial challenge to the current legal frameworks, and thus is being operated with only limited regulation.

Nomenclature

5. The diversity of the terminology which can be applied to drone technology is broad and politicised. The APPG is aware of the on-going debate about this terminology, for example, "Remotely Piloted Air Systems (RPAS)" versus "Unmanned Aerial Vehicles/Systems (UAV/S)". For simplicity, ease of reference and to enable the inclusion of both unmanned aerial and maritime vehicles, the APPG uses the term "drones". It does not use this term in a pejorative sense. The Group has noted that the Government, in its responses to Parliamentary Questions, uses a variety of terms to describe this technology including "remotely piloted aircraft system",[135] "unmanned aerial vehicles"[136] and "drones".[137] The Ministry of Defence's (MoD) Joint Doctrine 2/11, *The UK approach to unmanned aircraft systems*, makes it clear that the terms "Unmanned Aerial Vehicles/Systems" should be the primary wording used, with "Remotely Piloted Air Vehicles/Systems" used when speaking to the media. It would be helpful if there was a more consistent approach across Government on the terms used.

[132] The Group is chaired by Tom Watson MP (Lab); the Vice Chairs are Zac Goldsmith MP (Con) and Baroness Stern (CB); the Treasurer is John Hemming MP (LD); and the Secretary is Dave Anderson MP (Lab). The Group is staffed by a human rights researcher, which is currently funded, in the short-term by Reprieve (a human rights NGO). The Group has received funds from the Persula Foundation (registered March 2013);the Edith M Ellis 1985 Charitable Trust (registered June 2013; Trust for Research and Education on the Arms Trade; Polden-Puckham Charitable Foundation (registered September 2013). Please refer to the APPG's entry on the Parliamentary Register for more details. http://www.publications.parliament.uk/pa/cm/cmallparty/register/drones.htm

[133] House of Commons Debate, Hansard, 11 December 2012: column 42WH.

[134] The APPG on drones has collated and analysed all Parliamentary Questions on drones since 2012, please see http://appgondrones.wordpress.com/parliamentary-questions/

[135] Andrew Robathan MP, Minister of State for the Armed Forces, to Annette Brooke MP, Hansard, 12 June 2013: Column 328W.

[136] Andrew Robathan MP, Minister of State for the Armed Forces, to Tom Watson MP, Hansard, 17 June 2013: Column 503W.

[137] Baroness Warsi, Senior Minister of State, Department for Communities and Local Government & Foreign and Commonwealth Office, to Lord Patten, Hansard, 3 July 2013: Column WA219.

Casualty Counting

6. Parliament cannot reach a settled view on the wisdom of expanding the drone programme without an accurate assessment of the efficacy of this technology. There is a belief that the Ministry of Defence is holding more detailed information regarding casualties than it is prepared to admit. There are particular concerns at the numbers of civilian casualties caused by drones.

7. The recording of information relating to those killed and injured by UK drone strikes in Afghanistan is notable in its paucity. Answers to Parliamentary Questions have revealed that: "the Government does not record total figures for civilian casualties in Afghanistan because of the immense difficulty and risks that would be involved in collecting robust data."[138] Most worryingly, this response has been given consistently since 11 July 2011, indicative that despite a number of questions from concerned Parliamentarians, and in contrast to broader improvements made to casualty counting procedures by ISAF and the UN, the Government has not sought to address the challenges of casualty counting.[139] Despite this, the Government claims to have "strict procedures, frequently updated in light of experience, intended to both minimise the risk of casualties occurring and to investigate incidents that do happen"[140] and offers the assurance that "it did conduct post-strike assessments of every weapons release from Reaper".[141] Indeed, since 1 April 2008, the Government has paid:

> 2,833 ex gratia payments amounting to £3,596,902.00 ... to Afghan civilians up to 31 May 2013. Payments have been made in respect of deaths, injuries, road traffic incidents, property damage, and crop damage, occurring within Helmand Province and in Kabul.[142]

These payments appear to indicate that there are some mechanisms within the Ministry of Defence which are monitoring civilian deaths and injuries; the APPG encourage the Government to make this information publicly available. Further, the Government should consider that the absence of robust data collection on civilian casualties raises the question as to how the Government can be clear that they are making ex-gratia payments to the correct people.

8. While there is an obligation in international law to record the details of the deaths of combatants in international armed conflict, as set out in the Geneva Conventions, Afghanistan is considered to be a multinational Non-International Armed Conflict and thus the obligation on counting casualties, both civilian and fighter, differs from that required for an international armed conflict.[143] This is a subject of expansive debate for which there is not adequate space in this submission to address fully.[144] However, it can be concluded that the failure by the Government to lead the way in developing and adopting robust casualty counting mechanisms is problematic. For example, as highlighted by Action on Armed Violence, casualty recording is central to the fulfilment of victims' rights and the broader protection of civilians.[145] Accurate and systematic recording of casualties can be an important contribution to building and maintaining support for international intervention and in challenging the narrative produced by the enemy. From the perspective of military objectives, the recording of civilian casualties allows governments to assess their compliance with the international legal principles of distinction and proportionality. Respect for these principles is set out in the MoD's own *Basic Principles of the Law of Armed Conflict*[146] and also forms a fundamental part of customary international law.

9. The Government's lack of engagement with casualty counting is potentially negatively shaping the engagement between the UK and the United Nations in Afghanistan. For example, the UK has declined to participate in the report on the protection of civilians in armed conflict and in the review of criteria, advocated by the UN Mission in Afghanistan, to establish the positive identification and determination of status undertaken by international forces in Afghanistan.[147] The APPG is concerned that the Government's decision not to engage with improvements to casualty counting in Afghanistan will undermine efforts to improve this system domestically. Part of the UK's role in Afghanistan is to "train, advise and assist" which includes encouragement to the "Afghan National Security Forces to operate within the bounds of International Humanitarian Law, including with respect to mitigating and ensuring accountability for civilian casualties."[148] It is unclear how this role can be undertaken effectively if the UK is facing such challenges with its own casualty counting mechanisms.

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[138] Andrew Robathan MP, Minister of State for the Armed Forces, to David Anderson MP, Hansard, 13 June 2013: Column 410W.
[139] Andrew Robathan MP, Minister of State for the Armed Forces, to Yasmin Qureshi MP, Hansard, 19 June 2013: Column 722W.
[140] Andrew Robathan MP, Minister of State for the Armed Forces, to Yasmin Qureshi MP, Hansard, 18 June 2013: Column 584W.
[141] See Information Commissioner's Office, Freedom of Information Decision Notice, 7 February 2013, http://www.ico.org.uk/~/media/documents/decisionnotices/2013/fs_50462269.ashx
[142] Andrew Robathan MP, Minister of State for the Armed Forces, to Yasmin Qureshi MP, Hansard, 17 June 2013: Column 495W.
[143] See, International Committee of the Red Cross, Nils Melzer, *Interpretive guidance on the notion of direct participation in hostilities*, 2009.
[144] This issue has been extensively explored by the Oxford Research Group, see, for example, Professor Susan Breau, Marie Aronsson, Rachel Joyce, Oxford Research Group, *Discussion Paper 2: Drone attacks, International Law and the Recording of Civilian Casualties of Armed Conflict*, June 2011, http://www.oxfordresearchgroup.org.uk/sites/default/files/ORG%20Drone%20Attacks%20a nd%20International%20Law%20Report.pdf
[145] Action on Armed Violence, *Reclaiming the Protection of Civilians under International Humanitarian Law*, May 2013, http://www.aoav.org.uk/wp- content/uploads/2013/06/casualty-recording-presentation-oslo-for-website-230513.pdf
[146] See, for example, paras 2.6–2.8.2 on proportionality, Ministry of Defence, *Basic Principles of the Law of Armed Conflict*.
[147] Andrew Robathan MP, Minister of State for the Armed Forces, to David Anderson MP, Hansard, 10 June 2013: Column 7W.
[148] Andrew Robathan MP, Minister of State for the Armed Forces, to Yasmin Qureshi MP, Hansard, 18 June 2013: Column 584W.

10. This lack of information, on those killed by drones, raises very serious questions as to how the UK Government is able to ascertain that it is meeting its military objectives in Afghanistan as well as its legal obligations, for example, in respecting the principles of proportionality and the protection of civilians. To date, the Ministry of Defence claims to have killed only four civilians, on 25 March 2011, since the drone programme began in this context.[149] In contrast, the United States, in carrying out roughly the same amount of drone strikes in Pakistan, is believed to have killed between 411 and 890 civilians.[150] Most recently, a leaked internal Pakistani government document shows that, by their assessments, there were at least 147 civilian deaths, including 94 children, as the result of drone strikes between 2006–09.[151] The disparity in civilian casualties caused by US and UK drone strikes gives rise to a number of differing questions:

- How does the Ministry of Defence categorise casualties as civilian? Does this differ to the definition of civilians from that found in, and protected by, the Laws of War?
- Does our methodology, for both the categorisation and targeting of civilians, differ to that used by the United States?
- What are the Ministry of Defence's terms of engagement for drone strikes?
- How do these terms of engagement differ to the terms of engagement for fast jet strikes by the Ministry of Defence?
- How do these terms of engagement differ to the terms of engagement employed by the US Department for Defense?
- Does the Ministry of Defence not know, either prior to or after an attack, the status of those killed? Is this information only released internally?
- Is it true that the Ministry of Defence has killed more than four civilians but has declined to state this publicly?

None of these questions reflect well on the Ministry of Defence.

Casualty counting engages with the accuracy of this technology. Without the collation and utilisation of robust data on the identity and status of those killed, it is unclear how the MoD can establish the efficacy of drones. This further resonates with the future procurement plans of the Ministry of Defence where the accuracy of weapons must surely play a key role in the determination of new contracts.

Recommendation.

We encourage the Committee to:

- **engage robustly with the Government on the need to record the numbers and status of those killed by UK drone strikes;**
- **ask the Government to make this information available to Parliamentarians and the public alike;**
- **ensure that the Government strikes the correct balance between releasing information and the protection of British forces.**

Transparency and Accountability

11. The *Joint Doctrine* includes the objective to increase public debate on this technology, where it states "What is needed is a clear understanding of the issues involved so that informed decisions can be made".[152] Such a debate on drones is vital to the legitimate use of this technology by the Government.

[149] An International Security Assistance Force (ISAF) investigation carried out into this incident concluded "the actions of the Reaper crew had been in accordance with extant procedures and ISAF rules of engagement." Nick Harvey, Minister of State for the Armed Forces to Roger Godsiff, Hansard, 26 June 2012: Column 187W.

[150] The Bureau of Investigative Journalism is considered one of the most authoritative sources on casualty drone strike recording, see http://www.thebureauinvestigates.com/category/projects/drones/and figures from the New America Foundation which claimed there have been between 258 and 307 civilians killed by drones. http://natsec.newamerica.net/drones/pakistan/analysis

[151] See *Exclusive: Leaked Pakistani report confirms high civilian death toll in CIA drone strikes*, The Bureau of Investigative Journalism, 22 July 2013, http://www.thebureauinvestigates.com/2013/07/22/get-the-data-the-pakistan- governments-secret-document/

[152] Ministry of Defence, *Joint Doctrine 2/11, The UK approach to unmanned aircraft systems*, 2011, para 517.

[153] See, for example, Andrew Robathan MP, Minister of State for the Armed Forces to Yasmin Qureshi MP, Hansard, 18 June 2013: Column 583W on publishing casualty figures; Andrew Robathan MP, Minister of State for the Armed Forces to David Anderson MP, Hansard, 13 June 2013: Column 410W on data collection; Andrew Robathan MP, Minister of State for the Armed Forces to Tom Watson MP, Hansard, 12 June 2013: Column 323W on drones in Africa; Andrew Robathan MP, Minister of State for the Armed Forces to Anas Sarwar MP, Hansard, 10 June 2013: Column 19W on training costs; Andrew Robathan MP, Minister of State for the Armed Forces to Anas Sarwar MP, Hansard, 10 June 2013: Column 15W on support for the US; Baroness Warsi, Senior Minister of State, Department for Communities and Local Government & Foreign and Commonwealth Office, to Baroness Kinnock, Hansard, 25 February 2013: Column WA207 on legal frameworks; Andrew Robathan MP, Minister of State for the Armed Forces to Fabian Hamilton MP, Hansard 25 March 2013: Column 940W on US activities at UK air bases.

12. The APPG has consistently highlighted the lack of transparency and accountability about drone use by the UK Government. Currently this debate is being stymied by:

(a) limited responses to Parliamentary Questions, where the substance of the question is sometimes avoided and/or the relevant information is withheld;[154]

(b) extended delays in responses, by the Ministry of Defence, to Freedom of Information requests;

(c) a consistent emphasis within responses to Freedom of Information requests to withhold information;

(d) an absence of publicly accessible reports, publications and briefings on the development, deployment and use of drones by the Ministry of Defence.[155]

(e) Limited departmental debate on the issue.

13. As an example of the APPG's experience of the Freedom of Information Act, a request for the results of a local study on the psychological health of UAV pilots, cited in a Parliamentary Question, and undertaken in conjunction with another State, was refused on the basis that disclosure "would undermine the relationship of trust that exists between the UK and other countries". No efforts were made to ask the country in question if this information could be shared nor if the parts of the study, undertaken by the UK Government, could be shared. Anecdotal evidence from the APPG's civil society partners has highlighted a similar approach taken by Government to their enquiries.

14. Emblematic of the impact of this limited accurate information on drones can be seen in a recent survey on the UK public's attitude to drones. For example, the survey relied on the term "known terrorist" as the basis for the questions asked of respondents.[156] This is despite the fact that the identity and status of all of those killed by drones is not always assured.[157]

15. The Group's monitoring of Parliamentary Questions has revealed a number of key areas where the Government appears unwilling, or unable, to allow full Parliamentary scrutiny of key impacts relating to drone use. We advocate that such a secretive approach is unnecessary and undermines the role of Parliament in the assessment of the Government's defence policy. Further, a lack of transparency and accountability leads, perhaps unfairly, to the perception that the Government is not operating in compliance with its domestic and international human rights commitments, which in turn undermines its reputation at home and abroad.

Recommendation.

The Group urges the Committee to ask the Government to:

— **hold a departmental-led public engagement strategy on this technology, to facilitate the broader debate, including placing relevant evidence in the public domain;**

— **reconsider its approach to the application of transparency and accountability on the use of drone technology; and**

— **take a more consistent approach to the terminology used to refer to this technology so that greater clarity can be achieved.**

THE PSYCHOLOGICAL IMPACT OF DRONES

16. The Group is concerned by anecdotal evidence, currently primarily focused on US drone pilots, which raises questions as to the psychological impact of drones on those who operate them.[158] Some research has been undertaken in the United States by the USAF School of Aerospace Medicine. A 2011 study *Psychological Health Screening of Remotely Piloted Aircraft (RPA) Operators and Supporting Units* examined significant numbers of Predator/Reaper operators, Global Hawk operators and non-combatant airmen supporting drone operations for 'burnout' ie long-term exhaustion and a loss of interest/ability to carry out their jobs.

> The results of this study suggest there is a high incidence of emotional exhaustion/fatigue among RPA operators as a group in comparison to noncombatant airmen. Efforts to reduce occupational

[154] See, for example, Andrew Robathan MP, Minister of State for the Armed Forces to Yasmin Qureshi MP, Hansard, 18 June 2013: Column 583W on publishing casualty figures; Andrew Robathan MP, Minister of State for the Armed Forces to David Anderson MP, Hansard, 13 June 2013: Column 410W on data collection; Andrew Robathan MP, Minister of State for the Armed Forces to Tom Watson MP, Hansard, 12 June 2013: Column 323W on drones in Africa; Andrew Robathan MP, Minister of State for the Armed Forces to Anas Sarwar MP, Hansard, 10 June 2013: Column 19W on training costs; Andrew Robathan MP, Minister of State for the Armed Forces to Anas Sarwar MP, Hansard, 10 June 2013: Column 15W on support for the US; Baroness Warsi, Senior Minister of State, Department for Communities and Local Government & Foreign and Commonwealth Office, to Baroness Kinnock, Hansard, 25 February 2013: Column WA207 on legal frameworks; Andrew Robathan MP, Minister of State for the Armed Forces to Fabian Hamilton MP, Hansard 25 March 2013: Column 940W on US activities at UK air bases.

[155] This is particular pertinent with regard to the intermittent posting of Operational Updates on the RAF website; there is no consistency as to the inclusion of information on the activities of 39 Squadron who are charged with the UK's drones programme.

[156] oel Faulkner Rogers, "The Public View: British Attitudes to Drone Warfare and Targeted Killing", in Eds. Michael Aaronson and Adrian Johnson, *Hitting the target? How New Capabilities are Shaping International Intervention*, March 2013, pp 7–17, p 8.

[157] See, for example, Andrew Robathan MP to Yasmin Qureshi MP, Hansard, 19 June 2013: Column 722W and the use of signature strikes by the United States targets are selected on the basis of "pattern of life analysis", and Text of President Obama's May 23 speech on national security (full transcript), Washington Post, 23 May 2013.

[158] See, for example, Nicola Abe, *Dreams in Infrared: The Woes of an American Drone Operator*, Der Speigel, 14 December 2012, http://www.spiegel.de/international/world/pain-continues-after-war-for- american-drone-pilot-a-872726–3.html

> burnout should focus on operational stressors and be equally devoted to weapon and nonweapon-deploying RPA operators.[159]

17. A second study which surveyed 426 officer and enlisted operators (pilots and sensor operators), between 2010 and 2011 found that:

> Although a wide range of stressors may contribute to elevated levels of burnout, the majority of occupational stress was reported to stem from operational stress and not exposure to combat (eg, live video feed regarding the destruction or death of enemy combatants and ground forces).[160]

18. Most recently, media coverage of a forthcoming study from the US Department of Defense, indicates that rates of conditions such as anxiety, depression, post-traumatic stress disorder and substance abuse were the same as for pilots of manned aircraft, deployed in Iraq or Afghanistan.[161] This research indicates a relatively negligible impact on those involved in their use. In other words, it is the conditions of employment, rather than impact of using drones per se which seem to be problematic.

19. In the UK context, the Ministry of Defence's *Joint Doctrine* asks "do we fully understand the psychological effects on remote operators of conducting war at a distance?"[162] Responding to a Parliamentary Question from Mark Pritchard MP on 15 November 2010, the MoD stated that the Department was undertaking a local psychological study of the impact of combat drone use on drone pilots and commented that the "RAF Medical Services have not detected any instances of acute stress reaction in any pilot responsible for operation of UAVs."[163] A subsequent Freedom of Information request, submitted in Autumn 2012 to obtain a copy of this psychological study, received the response, in March 2013, that the report would be withheld on the grounds that the report was undertaken in conjunction with another Government. "While the MOD was provided copies of the report, the report which is within the scope of your request remains the copyright of that other Government. That Government has expressly not given permission for the MOD to release the report, which remains their copyright."[164]

20. In December 2012, the Minister for Defence Personnel, Welfare and Veterans stated that:

> Regarding psychological considerations, experience of operating the Reaper Remotely piloted Aircraft System (RPAS) suggests that far from being detached from the reality of the situation, Reaper aircrew are just as, if not more, connected to the situation on the ground as compared to operators of other aircraft types. ...[165]

There was no comment on the impact or consequences of this experience on drone operators within this answer. However, in answer to a further question, the MoD stated that the RAF had in place, for their Reaper Remotely Piloted Air Systems (RPAS) force, Trauma Risk Management strategies. "The RAF Medical Services have not detected any adverse psychological and physical trends for RAF pilots of RPAS."[166]

21. Further concerns have been raised about the perception that drones are perpetuating a more clinical and detached kind of warfare, where a lack of engagement with the "bloody reality" of conflict is leading to a more casual attitude to killing. The RAF Directorate of Defence Studies' examination of Unmanned Aerial Vehicles questioned whether a lack of personal engagement:

> raises the question of whether unmanned vehicles, whose operators can only experience war through a datalink, are in any meaningful sense involved in a "dialogue" with their adversary. Does the UAVs inherent lack of personal engagement encourage a lack of respect for one's enemy and through that, a dangerous degree of detachment?[167]

22. A report by MEDACT, published in 2012, on the physical and psychological implications of drones, further acknowledged this idea:

> All the aspects of battle, which normally enhance self-esteem and engender the esteem of others are absent and there is the potential for this work to erode the self-image of the drone operator as well as the image of the war hero in the public mind.[168]

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[159] Wayne Chappelle, Psy.D., ABPP; Amber Salinas, M.A.; Kent McDonald, LtCol, USAF, MC, FS :USAF School of Aerospace Medicine, Psychological Health Screening of Remotely Piloted Aircraft (RPA) Operators and Supporting Units, *Psychological Health Screening of Remotely Piloted Aircraft (RPA) Operators and Supporting Units,* (2011), p. 19–11

[160] Joseph A Ouma, Lt Col, USAF, MC, FS; Wayne L Chappelle, Psy.D., ABPP; Amber Salinas, M.A.*; Facets of occupational burnout among US Air Force Active Duty and National Guard/Reserve MQ-1 Predator and MQ-9 Reaper operators*, (2011), p.14.

[161] James Dao, *Drone Pilots are Found to Get Stress Disorders Much as Those in Combat Do*, New York Times, 22 February 2013.

[162] Ministry of Defence, (n21) p. 5–8.

[163] Andrew Robathan MP, Minister of State for the Armed Forces, Mark Pritchard MP, Hansard, 15 November 2010: Column 564W.

[164] Response to APPG Researcher, Freedom of Information request from Ministry of Defence, 8 March 2013.

[165] Andrew Robathan MP, Minister of State for the Armed Forces, to Craig Whittaker MP, Hansard, 6 December 2012: Column 901W.

[166] Andrew Robathan MP, Minister of State for the Armed Forces, Hansard, 25 February 2013: Column 38W.

[167] Ed Owen Barnes, *Air Power. UAVs: the Wider Context*, http://www.airpowerstudies.co.uk/UAV-Book.pdf, p. 95.

[168] Medact, *Drones: the physical and psychological implications of a global theatre of war,* (2012), p 8.

In this respect, the rise of the concept of drone pilots as suffering a "playstation mentality"[169] assisted by a US recruitment campaign for drone pilots which uses a simulated computer game to attract candidates,[170] can only undermine the professional standards upon which the RAF pride themselves and which is central to their public standing.

23. Taken further, the perception of the drone has an impact on how the US and UK are seen in the countries in which this weapon is used; a consideration examined the MoD's *Joint Doctrine*.

> The counter-insurgency operation must be perceived as ethically sound, above reproach, and the ill-considered use of armed unmanned aircraft offers an adversary a potent propaganda weapon.
>
> This enables the insurgent to cast himself in the role of underdog and the West as a cowardly bully—that is unwilling to risk his own troops, but is happy to kill remotely.[171]

It is not clear that these aims and objectives have been achieved nor how the MoD have engaged with this issue beyond its consideration in the *Joint Doctrine*.

24. Further consideration must also be given by the MoD to the psychological impact of drones on those living in affected areas. The *Living Under Drones* report, a joint research project undertaken by the International Human Rights and Conflict Resolution Clinic of Stanford Law School and the Global Justice Clinic at New York University School of Law, published in 2012, included a consideration of short and long-term psychological impact of drones in Pakistan.[172] The report found "Their presence [drones] terrorizes men, women, and children, giving rise to anxiety and psychological trauma among civilian communities."[173] More recently, in March 2013, the APPG was briefed by Dr Peter Schaapveld, a forensic psychologist, who had recently returned from a research trip to Yemen. His work found:

> In total 34 persons were interviewed during the three day clinic with the assistance of a translator. … . For nearly all of the subjects the triggering incident for the resulting abnormal mental health condition was an air strike. All continue to be affected by and prevented from recovery by the presence of drones…. In terms of results virtually all interviewed were found to be suffering from formal abnormal psychological conditions. The majority (71%) were found to be suffering from Post Traumatic Stress Disorder (PTSD).
>
> Other severe abnormal psychological conditions were found including Anxiety, Depression, dissociative experiences, panic reactions, hystericalsomatic reactions, exaggerated fear responses and abnormal grief reactions.[174]

25. The UK Government's responses to questions on the psychological impact of drones on those living under them in Afghanistan have elicited limited information: "We have no reason to believe that aerial strikes from whatever platform have had an adverse effect in general on the mental health and wellbeing of civilians in Afghanistan."[175] There is no indication that any relevant surveys, monitoring or evaluation has been undertaken on this impact.

Recommendation

We would like the Committee to raise with Government:

- **the need to consider the psychological impact of drones on both operators and affected populations.**

The Nature of the Broader Relationship between the Achievement of the UK's Military and Diplomatic Objectives and Drone use

26. The challenge faced by the UK, and its allies, in the development of a secure Afghanistan, are substantial. This task combines a need to effectively balance a range of sensitive political, diplomatic, military and development imperatives. We note the Government's commitment to "work ... to support the development of Afghan security, governance, infrastructure, economy and the provision of essential services." A sentiment echoed in the Government's most recent response to the Defence Committee's report, *Securing the Future of Afghanistan: Government Response to the Committee's Tenth Report of Session 2012–13*, in which a clear emphasis was placed upon the UK's commitment toward a stable, secure and sustainable Afghanistan.

27. The Group further notes the commitment as set out by the Government's Stabilisation Unit, to learn lessons from their experiences in complex environments. In this respect, the lack of adequate monitoring and evaluation of drone use in Afghanistan and their impact on the development imperatives within the stabilisation

[169] See, Drone Wars UK, *Convenient Killing: Armed Drones and the 'Playstation' Mentality* (2010).

[170] See, for example, *Will Video Games Help Air Force Recruit Drone Pilots?*, Sharon Weinberger, AOL News, 10 August 2010, http://www.aolnews.com/2010/08/19/air-force-working-on- video-game-to-recruit-drone-pilots/

[171] Ministry of Defence, (n21) p. 5–10.

[172] International Human Rights and Conflict Resolution Clinic of Stanford Law School and the Global Justice Clinic at New York University School of Law, *Living under Drones*, 2012, http://livingunderdrones.org/wp-content/uploads/2012/10/Stanford-NYU-LIVING-UNDER- DRONES.pdf see, for example, pages 81, 86, 150–1.

[173] *Living under Drones,* (n40) p.vii.

[174] Speaker's briefing, Dr Peter Schaapveld, 5 March 2013, available at http://appgondrones.wordpress.com/

[175] Andrew Robathan MP, Minister of State for the Armed Forces, to Tom Watson MP, Hansard 18 December 2012: Column 707W.

framework, is of concern. For example, according to responses to Parliamentary Questions, there has not been any research undertaken on:

- "retaliation attacks on local and international aid workers following drone strikes in Pakistan and Afghanistan";[176]
- details of those displaced by drone strikes as this is also not disaggregated by specific cause;[177]
- the effect of drone strikes on livelihood strategies in the areas affected;[178]
- the ability of the affected communities to access education;[179]
- and, referring to states where the Department for International Development is at work, the impact of drone strikes on shifting livelihood strategies in the affected regions in Somalia and Yemen as this information is not disaggregated by specific cause.[180]

28. It is also unclear if the Government is assessing the relationship between drones and political radicalisation in Afghanistan and Pakistan.[181] The Group is concerned that the slide into asymmetric warfare, as emblematised by the use of drones, is contributing to political radicalisation in the countries where this technology is used. Though there has been relatively limited research carried out on this relationship, the Pew Center's surveys have shown, as at March 2013, the approval for U.S. drone strikes to target extremists in Pakistanis was at 5% of respondents with over two-thirds, at 68% disapproving of such actions.[182] We also acknowledge the opinion surveys, undertaken by the Foreign and Commonwealth Office in the Federally Administered Tribal Areas of Pakistan in 2010 and 2011 which included a question related to drone strikes[183] and request the Government to undertake similar research in the domestic context. More broadly, the Group has concerns as to the political and emotional counter-productivity of using this technology in this context.

29. The APPG advocate the need for the Government to undertake research on the relationship between drones and political radicalisation. The absence of the collection and analysis of all of this information seems to be a short- sighted strategy. This absence undermines the potential for lessons to be learnt from the UK's intervention in Afghanistan and the effective pursuit of the UK's broader stabilisation objective.

30. More broadly, in their most recent research into global attitudes toward drone strikes, carried out by the United States, the Pew Center found:

> In 31 nations, at least half disapprove of the U.S. conducting drone missile strikes targeting extremists in places such as Pakistan, Yemen and Somalia. At least three-in-four hold this view in 15 countries from all corners of the world, including nations from the Middle East, Europe, Latin America and Asia. The only three countries where majorities support the drone campaign are Israel (64% approve), Kenya (56%), and the U.S. itself (61%).[184]

31. In the context of Pakistan, research undertaken by Stanford University indicated that the use of drones was negatively impacting upon community coherence and the social fabric of affected communities. Examples provided include a reluctance to attend community events such as weddings and funerals, and important tribal dispute-resolution bodies. Further, children were being held back from attending school by their parents and adults were not tending their fields or undertaking their usual economic activities.[185] The Group has concerns that similar affects are occurring in Afghanistan and, significantly, the lack of monitoring and evaluation of such an impact is preventing relevant mitigating measures being put in place.

Recommendation.

The Group encourage the Committee to ask the Government to monitor and evaluate these aspects of drone use including carrying out detailed studies and evaluations in affected areas to measure:

- **Impact on social attitudes;**
- **Impact upon political radicalisation;**
- **Impact upon social stability within communities with particular reference to access to education, economic activities and livelihoods;**

[176] Justine Greening, Secretary of State for International Development to Anas Sarwar MP Hansard, 13 June 2013: Column 402W.
[177] Justine Greening, Secretary of State for International Development to Anas Sarwar MP, Hansard, 10 June 2013: Column 56W.
[178] Justine Greening, Secretary of State for International Development to Anas Sarwar MP Hansard, 10 June 2013: Column 56W.
[179] Alistair Burt, Parliamentary Under Secretary of State for Foreign and Commonwealth Affairs to David Anderson MP, Hansard, 10 June 2013: Column 88W.
[180] Justine Greening, Secretary of State for International Development to Anas Sarwar MP, Hansard, 13 June 2013: Column 402W.
[181] Andrew Robathan MP, Minister of State for the Armed Forces, to David Anderson MP, Hansard, Hansard, 26 Feb 2013: Column 422W.
[182] Pew Center, *On Eve of Elections, a Dismal Public Mood in Pakistan*: Chapter 3: Attitudes toward the United States and American Policies, 7 May 2013. http://www.pewglobal.org/2013/05/07/chapter-3-attitudes-toward-the-united-states-and- american-policies/#drones-pakistan
[183] Alistair Burt, Parliamentary Under Secretary of State for Foreign and Commonwealth Affairs to Nicholas Soames MP, Hansard, 16 May 2013: Column 393W.
[184] Pew Center, America's Global Image Remains More Positive than China's but Many See China Becoming World's Leading Power, Chapter 2: Attitudes toward the United States, 18 July 2013, p. 15.
[185] *Living under Drones,* (n39), p. 88–99.

— **Relationship between drone strikes and internal and external displacement and migration patterns;**

— **Relationship between the aims and objectives of other Government Departments operational in the areas concerned and any associated security impact of drone strikes.**

Export

32. The UK Government has been a Missile Technology Control Regime (MTCR) Partner since 1987. In response to a Parliamentary Question, the Government stated that "The UK supports MTCR outreach to non-members to work towards wider adherence to the MTCR"[186] and has participated in outreach visits.[187] We would like to see the UK Government take a more robust and proactive approach to this outreach effort and give a greater commitment to raising awareness as to the UK Government's activities in this sphere.

33. As the Defence Select Committee are aware, in evidence before the Arms Control Export Committees, the Foreign Secretary, William Hague, was clear on the Government's commitment to the MTCR and drones,

> We are an advocate of strong controls [for drones], and along with our partners in the MTCR we are keen to ensure that they remain appropriately controlled. I think that will be very important, and given that more and more countries are interested in such technology, effective and appropriate controls in this area will remain very important. That is not to say that we do not need to amend them over time as technology changes, but it will remain very important to have strong controls.

In the Committee's subsequent report, published on 17 July 2013, it was recommended that:

> the Government states in its Response: a) what specific action it is taking within the Missile Technology Control Regime (MTCR) to ensure that the MTCR is not weakened in relation to drones, components of drones and drone technology; and b) whether it considers that any changes to UK export controls in relation to drones, components of drones and drone technology are necessary to achieve the Government's stated policy, and, if so, what those changes are and the date by which they will be implemented. The Committees further recommend that the Government states its policy on approving export licences for drones.[188]

Recommendation.

The Group supports the Defence Select Committee to:

— **draw on their work as part of the Arms Control Export Committees to ensure a consistent approach to the UK's participation in the Missile Technology Control Regime.**

The Shape of the US/UK Relationship and Drone Warfare

34. The relationship between the United States and the United Kingdom has been impacted by the rise of drone warfare. While the United States has been routinely and globally criticised for their abuse of international law in their (mis)use of drones, recently, there have been concerns at allegations of UK complicity with the United States illegal drone programme. The Group also draws attention to the concerns that drones are carrying out extra-judicial killings as a counter-terrorism measure by the United States, in violation of international law.

Operation of US drone operations from UK soil

35. The APPG has been concerned at allegations that US illegal drones strikes are being operated by US personnel based in the UK.[189] Evidence which appears to support this allegation was provided by an advertisement for a System Administrator, based at RAF Waddington for BOSH Global Services. The role requires "Active US Secret" security clearance for which only US citizens are eligible and "Operational experience with UAV's specifically PREDATORS". A private assurance, in a letter from the Minister of State for the Armed Forces, has indicated that the US does not operate drones from either RAF or United States Visiting Force bases in the UK and those US personnel employed at RAF Waddington are working in support of UK drone operations in Afghanistan. This assurance is undermined however by the answers to Parliamentary Questions on this issue which have highlighted a lack of clarity about US activities at UK RAF bases and the limited oversight applied by the UK Government to these activities. For example, in one response, it was stated that "The Ministry of Defence does not hold information on whether RAF Croughton or RAF Molesworth are used to support US operations".[190]

[186] Baroness Warsi, Senior Minister of State, Department for Communities and Local Government & Foreign and Commonwealth Office, to Lord Hylton, Hansard, 14 December 2012: Column WA262.

[187] Alistair Burt, Parliamentary Under Secretary of State for Foreign and Commonwealth Affairs to Anas Sarwar MP, Hansard, 10 June 2013: Column 92W.

[188] Committees on Arms Export Controls, *Scrutiny of Arms Exports and Arms Control (2013): Scrutiny of the Government's UK Strategic Export Controls Annual Report 2011 published in July 2012, the Government's Quarterly Reports from October 2011 to September 2012, and the Government's policies on arms exports and international arms control issues*, 17 July 2013, paras 25 and 90.

[189] See *US drones bombing Africa operated from RAF bases in the heart of the Lincolnshire countryside,* Mail on Sunday, 9 March 2013.

[190] Andrew Robathan MP, Minister of State for the Armed Forces to Fabian Hamilton MP, Hansard, 25 March 2013: Column 941W.

36. More recently, a complaint has been submitted by the human rights NGO, Reprieve to the UK National Contact Point for the Organisation for Economic Co-operation and Development (OECD) Guidelines alleging British Telecom's complicity in US drone strikes in the provision of a telecommunications link between RAF Croughton to USAF Camp Lemonnier, the East African hub of US drone operations. A similarly vague response was received to a Parliamentary Question on this telecommunications link, which noted "RAF Croughton is part of a worldwide US Defence communications network, and the base supports a variety of communications activity" and reaffirmed the lack of information held on US operations at Croughton.[191] A further question on the operation of US drones from UK soil elicited the bald response that "The US does not operate remotely piloted aircraft systems from the UK".[192] Yet it is unclear how, based on the aforementioned answers, such a statement can be made. These allegations and the failure by Government to provide adequate answers to questions raised by Parliamentarians are serious.

Recommendation.

The APPG encourage the Committee to take a robust approach to these issues and ask the Government to:

- **hold the United States Government to account on their international legal obligations as engaged by the drone programme;**
- **indicate how they are able to provide adequate oversight of the activities of the US Visiting Forces operational in the UK; and**
- **increase public confidence on this issue through a transparent response to Freedom of Information requests and Parliamentary Questions, among other mechanisms.**

Citizenship stripping

37. The APPG are aware of serious allegations of the relationship between the deprivation of British citizenship, under section 56 of the Immigration, Asylum and Nationality Act 2006, and the subsequent targeting of these individuals in US drone strikes. See, for example, the cases of Bilal al-Berjawi and Mohamed Sakr.[193] While this issue may be beyond the remit of the Defence Select Committee's inquiry, the Group draws attention to this issue because it engages both the shape of the US/UK intelligence relationship and with the UK's international and domestic human rights obligations.

Recommendation.

The APPG hope that attention will be paid by the Committee to the shape of the US/UK intelligence relationship as it relates to drones and an emphasis placed upon the protection of rights.

Conclusion

As noted above, the APPG on drones welcomes the scrutiny provided by this inquiry on the important issue of drones. The Group advocates the need by Government to increase transparency and accountability on the use of this technology and hopes that the work of the Defence Select Committee is able to make a key contribution to the debate on drones.

Summary of Recommendations

We encourage the Committee to:

- engage robustly with the Government on the need to record the numbers and status of those killed by UK drone strikes;
- ask the Government to make this information available to Parliamentarians and the public alike; and
- ensure the Government strikes the correct balance between releasing information and the protection of British forces.

The Group urge the Committee to ask the Government to:

- hold a departmental-led public engagement strategy on this technology, to facilitate the broader debate, including placing relevant evidence in the public domain;
- reconsider its approach to the application of transparency and accountability on the use of drone technology; and
- take a more consistent approach to the terminology used to refer to this technology so that greater clarity can be achieved.

[191] Andrew Robathan MP, Minister of State for the Armed Forces to John Hemming MP, Hansard, 25 March 2013: Column 940W.
[192] Andrew Robathan MP, Minister of State for the Armed Forces to John Hemming MP, Hansard, 25 March 2013: Column 940W.
[193] The Bureau of Investigative Journalism have undertaken an in-depth investigation into his issue, see, Chris Wood and Alice Ross, *Former British citizens killed by drone strikes after passports revoked, 27 February 2013,* http://www.thebureauinvestigates.com/2013/02/27/former-british-citizens-killed-by-drone- strikes-after-passports-revoked/

We would like the Committee to raise with Government:

— the need to consider the psychological impact of drones on both operators and affected populations.

The Group encourage the Committee to ask the Government to monitor and evaluate this aspect of drone use including carrying out detailed studies and evaluations in affected areas to measure:

— Impact on social attitudes;

— Impact upon political radicalisation;

— Impact upon social stability within communities with particular reference to access to education, economic activities and livelihoods;

— Relationship between drone strikes and internal and external displacement and migration patterns;

— Relationship between the aims and objectives of other Government Departments operational in the areas concerned and any security impact of drone strikes.

The Group supports the Defence Select Committee to:

— draw on their work as part of the Arms Control Export Committees to ensure a consistent approach to the UK's participation in the Missile Technology Control Regime.

The APPG encourage the Committee to take a robust approach to these issues and ask the Government to:

— hold the United States Government to account on their international legal obligations as engaged by the drone programme;

— indicate how they are able to provide adequate oversight of the activities of the US Visiting Forces operational in the UK; and

— increase public confidence on this issue through a transparent response to Freedom of Information requests and Parliamentary Questions, among other mechanisms.

The APPG hope that attention will be paid by the Committee to the shape of the US/UK intelligence relationship as it relates to drones and an emphasis placed upon the protection of rights.

This submission is made by the following named officers, on behalf of the All Party Parliamentary Group on drones:

Chair: Tom Watson MP (Lab);

Vice Chairs: Baroness Stern (CB); Zac Goldsmith (Con)

Treasurer: John Hemming MP (LD);

Secretary is David Anderson MP (Lab).

September 2013

Written evidence from Public Interest Lawyers on behalf of Peacerights

1. Introduction and Executive Summary

1.1 We have been asked by Peacerights to advise on the legality of the UK Government's use of armed drones. This is a matter of pressing public interest. Much debate has focused on the US Government's use of drones, including President Obama's recent announcement of increased codification of future US drone use.[194] However, there has been far less attention on the UK's drones programme. In this opinion we specifically address the UK Government's use of drones.

1.2 The UK deployed and used armed drones in Iraq[195] and piloted armed drones in Libya and possibly other territories,[196] but their use has grown considerably in recent years in the conflict in Afghanistan.[197] Several UK "Reaper" drones in Afghanistan are now operated from the UK.[198] There is no public information to suggest that the UK has yet used drones outside zones of armed conflict.[199] However, clearly, there is a risk

[194] C Woods, "*Obama Frames Covert Drone War as Necessary Evil",* The Bureau of Investigative Journalism (BIJ), 23 May 2013 (http://www.thebureauinvestigates.com/2013/05/23/obama-frames-covert-drone-war-as-necessary- evil/)

[195] *Dawn of the Drones,* Aerospace Defence Management Journal, Issue 42 (http://www.defencemanagement.com/article.asp?id=354&content_name=Aerospace&article=10649)

[196] http://www.guardian.co.uk/world/2012/jul/26/british-pilots-drones-libya

[197] Hansard, 1 November 2012: The UK has fired "293 Hellfire precision guided missiles and 52 laser guided bombs" from UK-controlled Reaper drones in Afghanistan.

[198] R. Wall, "*UK Conducts Firsts Reaper Drone Strike Controlled from Britain",* Bloomberg.com, 1 May 2013 (http://www.bloomberg.com/news/2013–05–01/u-k-conducts-firsts-reaper-drone-strike-controlled-from- britain.html). Although it is possible that they have been operated from RAF Waddington in Lincolnshire since at least October 2012. "*RAF Reaper Drone Squadron Stood Up at RAF Waddington",* BBC World News, 23 October 2012.

[199] Defence Minister Andrew Robathan has confirmed the UK does not use armed UAVs against terrorist suspects outside Afghanistan (Hansard, HC Deb 26 November 2012 c29W). However there is a question mark against unarmed drone use.

that continued use will lead the UK to deploy them in the same way as the US: to carry out extra-judicial killings outside a theatre of conflict.

1.3 There are also serious concerns that the UK is assisting the US in the execution of its own drones programme: through the provision of targeting intelligence by the intelligence services and the Ministry of Defence and Government Communications Headquarters (GCHQ);[200] logistical support (for example, provision of communications relays and the possible piloting of US drones at RAF Waddington[201]), and the deprivation of citizenship of UK citizens to facilitate US drone strikes against them.[202] However, we have concentrated on the UK's own use of drones in this opinion.

1.4 This opinion is divided into the following parts:

Section 1—Introduction and Executive Summary

Section 2—Factual Context

Section 3—Legality as Weapons Under International Law

Section 4—Legality of Use in Afghanistan under International Humanitarian Law (IHL)

Section 5—Legality of Use in Afghanistan under International Human Rights Law (IHRL)

Section 6—Other Public Law Duties associated with drones

Section 7—Conclusion

1.5 In brief, we conclude that in the absence of international agreements, armed drones themselves are unlikely to be illegal per se, but that fully automated drones would breach international law. As to whether the UK's use of drones in Afghanistan breaches international law: we have evaluated the available evidence of the UK's prolific use of drones in Afghanistan in light of the onerous restrictions which international humanitarian law (IHL) and international human rights law (IHRL) place upon their use. We conclude that it is highly likely that the UK's current use of drones is unlawful. There is a strong probability that the UK has misdirected itself as to the requirements of the IHL principles of proportionality, distinction and humanity and as to its human rights obligation to protect human life and to investigate all deaths (civilians and combatants alike) arguably caused in breach of that obligation. We conclude that the European Court of Human Rights (ECHR) is capable of application to the UK's use of drones and that human rights accountability and the rule of law require its application. We call for urgent accountability for the UK's drones programme.

2. Factual Context

2.1 A comprehensive survey of the factual material relating to drones is outside the scope of this opinion. We recommend the Drone Wars UK and Bureau of Investigative Journalism websites[203] for further details. In brief however, the increasing use and development of armed drones has led to calls for regulation and accountability for drone attacks from civil society, international institutions and international lawyers. There are many reasons for the growing concerns, which include the following:

2.1.1 The rapid increase in the use of drones since c.2009;[204]

2.1.2 Their use outside of zones of armed conflict by the US, creating a "global battlefield";

2.1.3 The high number of civilian casualties caused by their use[205] and concerns as to "blast radii" of the missiles used by drones,[206] despite claims as to accuracy;[207]

[200] This was the subject of legal challenge in *R (Noor Khan) v Secretary of State for Foreign & Commonwealth Affairs* [2012] EWHC 3728 (Admin). Permission for judicial review was denied, but is subject to appeal.

[201] R Verkaik, *"US Drones bombing Africa operated from RAF bases in the heart of the Lincolnshire countryside"* Daily Mail, 9 March 2013 (http://www.dailymail.co.uk/news/article-2290842/US-Drones-bombing-Africa- operated-RAF-bases-heart-Lincolnshire-countryside.html)

[202] C Woods, A K Ross & O Wright, *"British terror suspects quietly stripped of citizenship … then killed by drones",* The Independent, 18 February 2013 (http://www.independent.co.uk/news/uk/crime/british-terror- suspects-quietly-stripped-of-citizenship-then-killed-by-drones-8513858.html)

[203] See www.dronewarsuk.wordpress.com and http://www.thebureauinvestigates.com/category/projects/drones/.

[204] S. Rodgers, *"Drones by country: who has all the UAVs?",* The Guardian, 3 August 2012. (http://www.guardian.co.uk/news/datablog/2012/aug/03/drone-stocks-by-country) and S Rodgers, *"Drone War: every attack in Pakistan visualised",* The Guardian, 25 March 2013 (http://www.guardian.co.uk/news/datablog/interactive/2013/mar/25/drone-attacks-pakistan-visualised.) Although fatal US drone strikes took place in Afghanistan in 2001 and Yemen as early as November 2002.

[205] The Pakistan Government estimates over 400 civilians killed out of c.2,200 people killed overall by US drone strikes. A K Ross, *"Pakistan Government says at least 400 civilians killed in drone strikes",* BIJ, 15 March 2013 (http://www.thebureauinvestigates.com/2013/03/15/pakistan-government-says-at-least-400-civilians-killed-in- drone-strikes/). The Bureau of Investigative Journalism had calculated that 411–884 civilians had been killed by those strikes. P Bergen and K Tiedemann, *"The Drone Wars, Killing by remote control in Pakistan"*, The Atlantic Monthly, 27 October 2010 (http://www.theatlantic.com/magazine/archive/2010/12/the-drone-wars/308304/) records around 30% losses, albeit noting a decreasing trend.

[206] 15–20m, according to the NYU-Stanford Report, *Living Under Drones* (http://www.livingunderdrones.org). Blast radii vary according to the size and type of the warhead used.

[207] It is claimed that the slower flight velocity of drones provides them with greater precision than a manned aircraft. They can circulate above targets, and therefore can wait and evaluate. Once launched, missiles can be guided to their target. Some legal commentators have pointed to the opportunity that drones present for *greater* compliance with IHL than with other weapons systems (see eg Blank LR, *After "Top Gun": How Drones Strikes Impact the Law of War* 33 U Pa J Int'l L 675 2011–2012))

2.1.4 The risk of "playstation mentality"—disconnection from reality leading to prolific and inhumane use by the operator;[208]

2.1.5 The risk that the consequence-free nature of fighting remotely leads to increasing use of drones by Governments and thus loss of life;

2.1.6 The distance between perpetrator and strike location leading to a lack of accountability, investigation and reparation;

2.1.7 Continuing Government secrecy regarding their use;

2.1.8 The decreasing costs of drones leading to concerns as to proliferation and use by non-state actors;

2.1.9 Difficulties of detection and defence against their use;

2.1.10 Time-lag in operation of drones via satellite:[209] 1–4 seconds is significant when civilians may enter a target area;

2.1.11 Drones may place a greater emphasis on intelligence rather than visual recognition of a target's combat function. Intelligence can be, and is often, wrong;

2.1.12 Increasing automation leading to autonomous operation—automated firing systems are already employed in other weapons, such as counter-rocket systems and drone technology will soon be capable of carrying out automatic targeting and firing;[210]

2.1.13 The psychological effect on populations of the constant threat of possible drone strike;[211]

2.1.14 Converse concerns on the psychological effects on operators of "fighting remotely"; and

2.1.15 Drones use tending to increase information exchange (and thus complicity) with third states such as the US;[212]

…and that increased loss of life will result, and international peace and security compromised, perhaps irreversibly.

The UK's use of drones

2.2 Only a little is currently known about the UK's use of drones. The number of "weapons releases" per annum has been disclosed through FOIA responses[213] (27 in 2008; 44 in 2009; 70 in 2010; 102 in 2011; and 120 in 2012). The percentage of weapons releases by British drones in Afghanistan is high: research suggests that 38% of drones releases in Afghanistan in 2011 were by British drones.[214] This is extraordinary when it is considered that the UK has only a small number (c. 5) armed drones in Afghanistan, compared to over 100 US armed drones. David Cameron reportedly stated in December 2010 that UK drones had killed "more than 124 insurgents"[215] However, where the strikes are taking place, how they are taking place, and what deaths and injuries have resulted (whether to persons deemed "combatants" or civilians) is all unknown. For example, there has been no public acknowledgement of whether drones are used solely in a combat-support role or whether they are also carrying out "targeted killings": strikes on specifically targeted individuals carried out away from the battlefield. The evidence suggests that targeted killings are taking place.[216] However, attempts to obtain this information through Freedom of Information Act (FOIA) requests and Parliamentary questions have been blocked.

[208] Philip Alston and Hina Shamsi, *"A killer above the law"*, The Guardian, 2 August 2010 (http://www.guardian.co.uk/commentisfree/2010/feb/08/afghanistan-drones-defence-killing). See also P.W.Singer, *"Military Robots and the Laws of War",* The New Atlantis, Number 23, Winter 2009, pp. 25–45, (http://www.thenewatlantis.com/publications/military-robots-and-the-laws-of-war.)

[209] Philip Alston and Hina Shamsi, "*A killer above the law"*, The Guardian, 2 August 2010. See also P W Singer, *"Military Robots and the Laws of War",* The New Atlantis, Number 23, Winter 2009, pp. 25–45, (http://www.thenewatlantis.com/publications/military-robots-and-the-laws-of-war.)

[210] *The UK Approach to Unmanned Aerial Systems*, MoD, JDN 2–11, 30 March 2011 paras 507–8 records the MoD's view that such operations are potentially legal: "*it would be only a small technical step to enable an unmanned aircraft to fire a weapon based solely on its own sensors, or shared information, and without recourse to higher, human authority. Provided it could be shown that the controlling system appropriately assessed the LOAC principles (military necessity; humanity; distinction and proportionality) and that ROE were satisfied, this would be entirely legal…"* The MoD goes on to note that it has no "current intention" to develop wholly unmanned systems.

[211] "*Drone attacks traumatizing a generation of children",* Channel 4 News, 5 March 2013 (http://www.channel4.com/news/drone-attacks-traumatising-a-generation-of-children)

[212] Supra, note 17, pp.4–6 "*the practicalities of retaining sovereignty for key enablers, such as communications and navigation systems, are already unrealistic*".

[213] C Cole, "*Turning the spotlight on British drone secrets",* dronewars.net, 8 March 2013 (http://dronewarsuk.wordpress.com/2013/03/08/turning-the-spotlight-on-british-drone-secrets/)

[214] C Woods and A K Ross, *Revealed: US and Britain launched 1,200 drone strikes in recent war,* BIJ, 4 December 2010 (http://www.thebureauinvestigates.com/2012/12/04/revealed-us-and-britain-launched-1200-drone-strikes-in- recent-wars/)

[215] R Winnett, *"British Troops could withdraw from Afghanistan before next Christmas",* The Telegraph, 7 December 2010 (http://www.telegraph.co.uk/news/uknews/defence/8185561/British-troops-could-withdraw-from- Afghanistan-before-next-Christmas.html)

[216] Drone Wars UK briefing to the Parliamentary Defence Select Committee: "We know from published RAF operational updates that UK Reapers have tracked "high value" targets for many hours before finally launching weapons", citing "*RAF and Joint Helicopter Force (Afghanistan) Weekly Ops Update"* 19–25 February 2012 (http://www.raf.mod.uk/rafoperationalupdate/opsupdate/opsupdate25feb2012.cfm.)

2.3 Only a single incident of civilian death caused by a UK drone has been reported.[217] This occurred on 25 March 2011 when a Reaper fired on two pick-up trucks. Two insurgents and four civilians were said to be killed and two civilians were injured. A further incident in 2009 in which two children were injured has also been reported.[218] It is also known that a drone was involved in the death of a British serviceman in 2009 from "friendly fire". Tellingly, it was reported following the Inquest that *"British Army staff in the operations room saw pictures of the base beamed from a camera on an unmanned drone, but instead of recognising it as Patrol Base Almas, they believed it was an insurgent location and sent the attack helicopters in."*[219]

2.4 In June 2012, Defence Minister Nick Harvey said that an International Security Assistance Force (ISAF) investigation had been carried out into the 25 March 2011 incident and had concluded that the actions of the Reaper crew were "in accordance with extant procedures and ISAF rules of engagement".[220] The report is being withheld. He also referred to this case as the only instance of civilian deaths caused by UK drones that he was "aware" of.

2.5 It is improbable that these two incidents are the only instances of civilian casualties caused by UK drone attacks. When the Prime Minister reportedly stated in 2010 that 124 "insurgents" had been killed, FOIA responses show that 144 drone strikes had been carried out at that time. Since then 222 further strikes took place in 2011–12 alone. And the numbers of strikes are increasing. This suggests that over 350 Afghans have been killed by UK drones, but with a civilian casualty rate of c.1%. This is far lower than the accepted estimates of civilian casualties caused by the US drone programme. One possible explanation is that UK/ISAF rules of engagement are stricter than the US. Another may be that the way the UK uses drones is different: for example if "targeted killings" are never or are only infrequently carried out and ordinary drone use is confined to the "battlefield". However, neither explanation satisfactorily explains the low UK civilian casualty claims. There is no reason why civilian casualties would be markedly different between a "battlefield" strike and a "targeted killing" given that both types of strike strive to avoid civilian casualties and given that the "battlefield" in counter-insurgency operations in Afghanistan is usually an area used, farmed and populated by civilians. The UK statistic suggests that civilian casualties are not being accurately recorded or investigated; and that an overly-broad definition of "combatant" is being used by British forces.

Current investigations

2.6 The international community has now begun to act to investigate drone use. In January 2013, the UN Special Rapporteur on Counter-Terrorism and Human Rights, Ben Emmerson QC, announced an investigation into 25 case studies of drone strikes from Pakistan, Yemen, Somalia, Afghanistan and Palestine, stating:[221]

> *"The exponential rise in the use of drone technology in a variety of military and non-military contexts represents a real challenge to the framework of established international law and it is both right as a matter of principle, and inevitable as a matter of political reality, that the international community should now be focussing attention on the standards applicable to this technological development, particularly its deployment in counterterrorism and counter-insurgency initiatives, and attempt to reach a consensus on the legality of its use, and the standards and safeguards which should apply to it. The plain fact is that this technology is here to stay, and its use in theatres of conflict is a reality with which the world must contend. It is therefore imperative that appropriate legal and operational structures are urgently put in place to regulate its use in a manner that complies with the requirements of international law, including international human rights law, international humanitarian law (or the law of war as it used to be called), and international refugee law."*

His investigation is expected to report in October 2013. He has indicated that the UK Government will be asked to cooperate with the investigation, which suggests that a UK strike in Afghanistan may be among the case studies. He has also indicated an intention to set up a permanent investigations unit with the UN Special Rapporteur on Extrajudicial, Arbitrary or Summary Executions.[222]

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[217] N Hopkins, "*Afghan Civilians Killed by RAF Drone",* The Guardian, 5 July 2011 (http://www.guardian.co.uk/uk/2011/jul/05/afghanistan-raf-drone-civilian-deaths)

[218] *Ibid.*

[219] N Britten, "*Coroner Accuses Army Officials of 'Complete Loss of Situational Awareness'*" Over Soldier's Death, The Telegraph, 7 September 2012 (http://www.telegraph.co.uk/news/uknews/defence/9528804/Coroner-accuses- Army-officials-of-complete-loss-of-situational-awareness-over-soldiers-death.html)

[220] Hansard, HC Debates, 26 June 2012: Column 187W (http://www.publications.parliament.uk/pa/cm201213/cmhansrd/cm120626/text/120626w0002.htm)

[221] B Emmerson, "*UN Special Rapporteur on Counter-Terrorism and Human Rights concerning the launch of an inquiry into the civilian impact, and human rights implications of the use drone and other forms of targeted killing for the purpose of counter-terrorism",* News Release, 24 January 2012 (http://www.ohchr.org/Documents/Issues/Terrorism/SRCTBenEmmersonQC.24January12.pdf)

[222] O Bowcott, *"UN to investigate civilian deaths from US drone strikes",* The Guardian, 25 October 2012 (http://www.guardian.co.uk/world/2012/oct/25/un-inquiry-us-drone-strikes)

2.7 The Parliamentary Defence Select Committee is investigating the UK's use of drones in Afghanistan.[223] An all-parliamentary group on drones has also been launched.[224] Given the statistics above, such scrutiny is long overdue.[225]

3. Legality as Weapons under International Law

3.1 Ben Emmerson QC may be correct that "drones are here to stay", but this does not preclude asking whether they are, as a class of weapons, lawful. This is the same exercise that the International Court of Justice carried out at the request of the UN General Assembly regarding nuclear weapons in its advisory opinion of 8 July 1996.[226] Indeed, International Humanitarian Law (IHL) requires (Art 36 Additional Protocol (1) AP(1)) a review of any new weaponry for compliance with its standards.

3.2 We therefore ask whether drones are legal weapons under international law. This is, in essence, to ask whether or not drones comply with the *jus ad bellum*—the laws governing the resort to force.[227]

3.3 The international community has acted to ban and regulate certain weapons through the conclusion of weapons-specific treaties, including poison and poisoned weapons; biological and bacteriological weapons; gas and chemical weapons; incendiary weapons; laser weapons designed to cause permanent blindness; explosive bullets; expanding bullets; booby-traps and anti-personnel mines; cluster munitions; non-detectable fragments; and explosive remnants of war. Lord Bingham once expressed an opinion that drones may join this list.[228]

3.4 There is some debate as to whether drones constitute "weapons" or are simply a means of delivering them. But just as missiles deliver their payload, and guns deliver a bullet, it is submitted that drones, as part of a weapon delivery system, should be classed as weapons. In any event, any technical distinctions of this nature should not permit armed drones to circumvent legal prohibitions on the use of weapons.

3.5 However, the ICJ's *Nuclear Weapons* judgment shows the difficulty of arguing that a particular weapon is prohibited by international law in the absence of specific conventional prohibition. There are very few conventions that relate to drones. Even where, in the case of nuclear weapons, there were a growing number of conventions limiting the acquisition, manufacture, possession, deployment and testing of nuclear weapons, the ICJ found that they did not in themselves amount to a comprehensive conventional prohibition on their use (§63) nor had any such customary international law rule emerged (§73). Part of the reason for this was that the main nuclear weapons convention—the Non-Proliferation Treaty—had specifically permitted the then five nuclear weapon states to retain their weapons.

3.6 The ICJ also considered whether IHL prohibited the use of nuclear weapons.

> IHL does not permit any and all weapons to be used. Art 22 1907 Hague Regulations records that "*the right of belligerents to adopt a means of injuring the enemy is not unlimited*". Principles of IHL prohibit the use of weapons that do not discriminate between civilian and military targets and which cause unnecessary suffering. These prohibitions are now recorded in Additional Protocol 1 ("AP1").

Art 35(2) states as follows:

> *"It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering."*

Art 51(5) states:

> *"5. Among others, the following types of attacks are to be considered as indiscriminate:*
>
> *…(b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated."*

Art 52(3) states:

> *"3. In case of doubt whether an object which is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or a school, is being used to make an effective contribution to military action, it shall be presumed not to be so used."*

3.7 In the *Nuclear Weapons* case, the ICJ found that these principles must be applied to any contemplated *use* of nuclear weapons. The Court found that the principles governing the use of nuclear weapons were "intransgressible" (§78) and observed that "*in view of the unique characteristics of nuclear weapons,…the use*

[223] C Cole, *"UK Defence Select Committee to investigate use of armed drones",* Drone Wars UK, 20 November 2012 (http://dronewarsuk.wordpress.com/2012/11/20/uk-defence-select-committee-to-investigate-use-of-armed- drones/)

[224] A K Ross, *"UK Parliament launches group to focus on drones",* BIJ, 18 October 2012 (http://www.thebureauinvestigates.com/2012/10/18/uk-parliament-launches-group-to-focus-on-drones/)

[225] Department of Justice White Paper, NBC News (http://msnbcmedia.msn.com/i/msnbc/sections/news/020413_DOJ_White_Paper.pdf)

[226] "Legality of the Threat or Use of Nuclear Weapons"—ICJ Advisory Opinion of 8 July 1996—General List No. 95 (1995–1998)

[227] The *jus in bello* is the laws of war, or IHL, that is, the rules applying to how states must conduct themselves during international or non-international armed conflicts.

[228] J Rozenberg, *Interview with Lord Bingham on the Rule of Law*: "it may be, I'm not expressing a view, that unmanned drones that fall on a house full of civilians is a weapon the international community should decide should not be used." (http://www.biicl.org/files/4422_bingham_int_transcript.pdf)

of such weapons in fact seems scarcely reconcilable with respect for such requirements" (see §§92–95). However, although the distinction may not be important, it was unable to declare nuclear weapons themselves to be incompatible with them. In light of this conclusion, and the current proliferation of drones, it is unlikely that drones would be found to contravene these principles *per se* such that they could be declared to be unlawful. However, applying these principles to the use of drones within armed conflict may demonstrate that armed drones are unlawful according to IHL, either completely or in all but very limited circumstances. This is explored in section 4 below.

3.8 However it is possible to conclude now that autonomous drones *are* unlawful *per se* under IHL. They fall foul of the *jus ad bellum* in that robots do not fall within the definition of lawful combatants.[229] In our opinion they would, as a class of weapons, also breach IHL's requirements of *humanity* and *distinction* (see section 4 below). They may not therefore take part in combat operations. Autonomous drones, whilst no doubt under development (the UK's estimate is that the technology will be available in five to 15 years[230]), have not yet been deployed. It is possible that conventional prohibition could also be achieved before proliferation. The UN Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions recently called for such control.[231]

3.9 Of course, the international community may still regulate and, if necessary, prohibit the use of drones through arms control treaties. This has been the practice in relation to emerging methods of warfare in the past, sometimes regarding modes of warfare not dissimilar to drones.[232] However, this practice has decreased and progress slowed down in the post-WWII years. Nevertheless, an international drones treaty should be firmly on the agenda of governments and civil society. Whilst we await that, drones are deemed to be regulated by the voluntary Missile Technology Control Regime (MTCR),[233] to which 34, mainly Western, countries are a party. The MTCR is intended to limit proliferation through shared common export control guidelines and a common list of controlled items. The separate arrangements. However, these schemes do not seek to prevent or regulate how drones are used. Wassenaar Arrangement[234] stipulates further voluntary non-proliferation.

3.10 As noted above that Art 36 of the Additional Protocol to the Geneva Conventions (AP1) requires governments to consider and determine whether any new weapon, means or method of warfare complies with the above principles and any other rule of "international law applicable to the High Contracting Party". It states as follows:

> *"Art 36. New weapons*
>
> *In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party."*

The UK Government is therefore under a duty to consider whether armed drones contravene any rule of IHL and, indeed, of international law, including IHRL. Note that the duty applies not only to weapons, but also methods of warfare. Such an analysis need not anticipate every possible unlawful use of a weapon, but must focus on its normal, anticipated, use. However, it must be a comprehensive review of likely usage.

3.11 The UK Government has stated in response to Freedom of Information Act (FOIA) requests that it has carried out an Art 36 review of the Reaper drone, "comprising legal reviews dated 3 August 2006, 4 February 2008, 14 May 2010 and 29 November 2010". However, it refuses to disclose any of the documentation. It is not therefore known whether the UK's Art 36 review complied with this standard.

4. Legality of use in Afghanistan under IHL

4.1 As can be seen from the *Nuclear Weapons* case, it is unlikely that drones themselves—ie their manufacture, stockpiling, export etc, would be ruled to contravene IHL principles such that they are deemed to be unlawful *per se*, ie that they violate the *jus ad bellum*. However, the question of whether the UK's use of armed drones complies with the laws governing the conduct of war—the *jus in bello*—is much more likely to lead to a conclusion that drone use is unlawful. As the UN Special Rapporteur on Extrajudicial, Arbitrary or Summary Executions has stated:

> *"a missile fired from a drone is no different from any other commonly used weapon, including a gun fired by a soldier or a helicopter or gunship that fires missiles. The critical legal question is the same for each weapon: whether its specific use complies with IHL."*[235]

[229] See Vogel, *Drone Warfare and the Law of Armed Conflict,* 39 Denv J Int'l L & Pol'y 101 2010–2011, at 137. (See also http://www.thenewatlantis.com/publications/military-robots-and-the-laws-of-war.)

[230] *Supra* note 17.

[231] N Cumming-Bruce, *UN Expert Calls for Halt in Military Robot Development*, New York Times 30 May 2013 (http://www.nytimes.com/2013/05/31/world/europe/united-nations-armed-robots.html?_r=0)

[232] For example, the *Declaration Concerning the Prohibition, for the Term of Five Years, of the Launching of Projectiles and Explosives from Balloons or Other New Methods of a Similar Nature*, signed at The Hague 29 July 1899.

[233] http://www.mtcr.info/english/index.html

[234] http://www.wassenaar.org/

[235] Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, *Study on Targeted Killings*, 28 May 2010 (A/HRC/14/24/Add.6) (http://www2.ohchr.org/english/bodies/hrcouncil/docs/14session/A.HRC.14.24.Add6.pdf)

4.2 IHL applies to the conflict in Afghanistan, to which the UK is a party as a member of the International Security and Assistance Force (ISAF). ISAF operates in Afghanistan at the invitation of the Afghan Government, and is permitted to use force through successive UN Security Council Resolutions authorizing the taking of "all necessary measures".[236] The conflict in Afghanistan, is generally accepted to be a non-international armed conflict,[237] since the Taliban were deposed and Hamid Karzai's government, in which the Afghan Government were elected. In that conflict, is assisted by ISAF in suppressing insurgent Taliban forces.

4.3 If the conflict is accepted to be non-international in nature, then the Geneva Conventions do not apply, save for Common Article 3 (the requirement of humane treatment). However, customary international humanitarian law (described below) does apply, and this largely reflects the content of the conventions. This is the applicable IHL.

4.4 The UK accepts that IHL governs its conduct in Afghanistan, although it seeks to avoid the application of human rights law (as described in section 5 below). The US also accepts that IHL applies to the conflict in Afghanistan.[238] The US also, controversially, states that IHL applies to its use of drones for targeted killing outside recognised zones of armed conflict ie in Africa, Yemen, and Pakistan. In a reverse of the Bush administration's efforts to avoid IHL (the Geneva Conventions) applying to its use of torture in Guantanamo and at rendition sites (through its (mis)use of "unlawful combatant" status), the US now positively welcomes the application of this body of law. The reason has less to do with a change of administration, but the nature of the acts carried out. Whilst IHL prohibits torture absolutely, it permits and sanctions the killing of combatants within armed conflict. However, there is no precedent and no adequate justification for the "global battlefield" that the US administration posits.[239] As such, any UK complicity in the operation of the US programme would be similarly unlawful.

4.5 There are four key principles said to be derived from IHL regarding the use of force during conflict: *necessity*, *humanity*, *proportionality* and *distinction.*[240] These principles are relevant to answering the questions of if and when and in what circumstances the UK may use armed drones in Afghanistan.

4.6 The principles of *necessity*, *humanity*, *proportionality* and *distinction* are stated to be the "basic principles of the law of armed conflict" in the MoD's own Manual of the Law of Armed Conflict.[241] And the ICJ found the principles of distinction—between combatants and civilians—and of humanity—avoiding unnecessary suffering—to be the "cardinal principles" of IHL in its *Nuclear Weapons* decision.[242]

4.7 The ICRC's authoritative study of customary international humanitarian law[243] also confirms that the four principles have attained the status of customary international law. Customary international law is a binding body of international law enforceable between states and, in certain circumstances, between an individual and the state. It is defined in the statute of the International Court of Justice as *"evidence of a general practice accepted as law"* (Art 38(1)(b)). It is important to establish that customary international law effectively protects these four principles for two reasons. Firstly, because the Geneva Conventions only apply to international armed conflict. So it is important to establish that equivalent customary rules govern the conduct of hostilities in Afghanistan. Secondly, because, unlike treaties such as the Geneva Conventions (which have not been incorporated into English law[244]), customary international law can be enforced directly by individuals in domestic courts (see *enforcement* heading at the end of this section below).

4.8 The ICRC's customary international humanitarian law study reviewed state practice and *opinio juris* regarding the principles of IHL taken by states to apply during armed conflict in general. This resulted in a comprehensive list of customary international humanitarian law rules. This is an authoritative and important source of the law that applies the principle of *distinction* is reflected in Rule 1 (*the principle of distinction between civilians and combatants*); Rule 7 (*the principle of distinction between civilian objects and military objectives*); Rule 11 (*Indiscriminate attack*) and Rule 20 (*Advance warning*). The principle of *necessity* is reflected in Rule 2 (*Violence aimed at spreading terror among the civilian population*) and Rules 16 (*Target verification*) and 21 (*Target selection*). The principle of *proportionality* is reflected in Rule 14 (*Proportionality in attack*); Rule 15 (*Precautions in attack*); and Rule 17 (*Choice of means and methods of warfare*). And the principle of *humanity* can be seen reflected in Rule 70 (*Weapons of a nature to cause superfluous injury or unnecessary suffering*); Rule 87 (*Humane treatment (civilians)*) and Rule 89 (*Violence to life (civilians)*). Also of relevance is Rule 150 (*Reparation*).

[236] See UNSCR 1386 (2001) UN Doc S/RES/1386 (2001) and successor resolutions, most recently UNSCR 2069 (2012) UN Doc S/RES/2069 (2012).

[237] "*Afghanistan, Applicable International Law",* Rule of Law in Armed Conflicts Project (http://www.geneva- academy.ch/RULAC/applicable_international_law.php?id_state=1)

[238] J Garamone, *"Geneva Convention Applies to Taliban, not Al Qaeda",* American Forces Press Service, 7 February 2002 (http://www.defense.gov/News/NewsArticle.aspx?ID=43960)

[239] For a robust critique of the US' legal approach, see O'Connell, *Remarks: The Resort to Drones Under International Law*, 39 Denver J Int'l L & Pol'y 585 2010–2011 at 585.

[240] See Ministry of Defence Joint Service Manual of the Law of Armed Conflict, Joint Service Publication 383, 2004 Edition (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27874/JSP3832004Edition.pdf)

[241] *Ibid*, Ch.2

[242] *Supra,* note 33 at [78]

[243] Customary International Humanitarian Law, Vol. I, Henckaerts & Beck, ICRC (2009) (see http://www.icrc.org/customary-ihl/eng/docs/home)

[244] Save for the Geneva Conventions Act 1957 (http://www.legislation.gov.uk/ukpga/Eliz2/5–6/52/contents)

4.9 We now analyse the UK's use of drones according to each of the four principles of IHL below.

Necessity

4.10 The concept of military necessity—that armed attacks must offer a "definite military advantage"—is generally assumed to be satisfied in relation to the US/UK drone programme, certainly that operating in Afghanistan. However, this principle is not one of mere generality; the test must be satisfied in respect of each individual drone attack. This requires knowledge of the drone strikes carried out by the UK, information that is not currently available.

4.11 However, the question of whether the drones programme in general is militarily necessary is not as straightforward as may first appear. Primarily because the use of drones is viewed by many as counter-productive, as they radicalize the civilians living under their shadows. As Professor Ryan Vogel summarises:

> *"Some…assert that the military advantage of many of the drone attacks is minimal to nil, because either the importance of the target is often overstated or, more importantly, because the civilian losses generate increased hostility among the civilian population, thereby fuelling and prolonging the hostilities."*[245]

The previous Prime Minister of Pakistan has stated that drone strikes *"do no good, because they boost anti-American resentment throughout the country."*[246]

Recent testimony before the US Senate Judiciary Committee from a Yemeni witness to drone attacks confirmed the same.[247] See also the NYU-Stanford Report "Living Under Drones".[248] It is therefore debatable that the use of drones are a military "own goal", which, properly evaluated, fall foul of the requirement of military necessity. Certainly, this is a question which needs a careful answer, both as a matter of generality and on a case-by-case basis.

4.12 The UK's approach to the principle of necessity in relation to drones is not known. There is an urgent need for clarification.

Humanity

4.13 According to the MoD manual on the Law of Armed Conflict, the principle of humanity "forbids the infliction of suffering, injury, or destruction not actually necessary for the accomplishment of legitimate military purposes". It therefore restricts inflicting further suffering than is absolutely necessary.

4.14 Applied to drones, we take this principle to prohibit killing a combatant with a drone when it is possible to disable or arrest the combatant, or if the combatant would wish to surrender. When troops are on the ground in Afghanistan, this principle, applied properly, should significantly curtail the use of drone strikes. Without its application, there is a significant risk that as increasing reliance is placed on drones, humanitarian options for detaining personnel cease to appeal to military planners.[249] Until such time as a drone is invented that merely disables its targets, these weapons may often therefore breach the principle of humanity.

4.15 The ICRC supports such an interpretation. In its Interpretive *Guidance on the Notion of Direct Participation in Hostilities*[250] it states as follows (p.80):

> *"While it is impossible to determine, ex ante, the precise amount of force to be used in each situation, considerations of humanity require that, within the parameters set by the specific provisions of IHL, no more death, injury, or destruction be caused than is actually necessary for the accomplishment of a legitimate military purpose in the prevailing circumstances."*

4.16 This aspect of the ICRC's interpretation of the principle of humanity is controversial however. Whilst he questions the ICRC's use of authorities for the proposition, Professor Ryan Goodman also argues for the same:[251]

> *"…the modern law of armed conflict (LOAC) supports the following maxim: if enemy combatants can be put out of action by capturing them, they should not be injured; if they can be put out of action by injury, they should not be killed; and if they can be put out of action by light injury, grave injury should be avoided."*

He argues for the least-restrictive-means (LRM) to be used against targets, citing a number of existing IHL provisions in support, such as the "release on the spot rule" in the ICRC Commentary to Additional Protocol

[245] Vogel, *Drone Warfare and the Law of Armed Conflict,* 39 Denv J Int'l L & Pol'y 101 2010–2011, p.126

[246] S Shane, *C.I.A. to Expand Use of Drones in Pakistan*, New York Times 3 December 2009 (http://www.nytimes.com/2009/12/04/world/asia/04drones.html?pagewanted=all)

[247] G Greenwald, "*A Young Yemeni writer on the impact and morality of drone-bombing his country",* The Guardian, 1 May 2013 (http://www.guardian.co.uk/commentisfree/2013/may/01/ibrahim-mothana-yemen-drones- obama)

[248] *Living Under Drones*, NYU-Stanford, September 2012 (http://www.livingunderdrones.org)

[249] See eg Asim Qureshi, *The "Obama doctrine": kill, don't detain,* The Guardian 11 April 2010 (http://www.guardian.co.uk/commentisfree/cifamerica/2010/apr/11/obama-national-security-drone-guantanamo)

[250] N Melzer, "*Direct Participation in Hostilities Under International Humanitarian Law"*, ICRC, May 2009 (http://www.icrc.org/eng/assets/files/other/icrc-002–0990.pdf)

[251] Goodman, "*The Power to Kill or Capture Enemy Combatants"*, NYU Research paper, 8 February 2013 (http://ssrn.com/abstract=2213960)

1, whereby military units must release and indeed humanely supply enemy combatants they come across in the field if they are unable to detain them.

4.17 Most tellingly, this interpretation also finds support in the UK Ministry of Defence's own Manual on the Law of Armed Conflict,[252] cited by the ICRC in its guidance. It states as follows (§2.2):

> *"Military necessity permits a state engaged in an armed conflict to use only that degree and kind of force, not otherwise prohibited by the law of armed conflict, that is required in order to achieve a legitimate purpose of the conflict, namely the complete or partial submission of the enemy at the earliest possible moment with the minimum expenditure of life and resources."*

Goodman notes that the MoD authors of the manual took issue with the ICRC's interpretation of this passage, but also notes that an author's views as to interpretation are not conclusive.

4.18 Does adopting this "least restrictive means" approach mean not only that the UK must disable/capture targets when possible, but also that they must do so even when this involves the assumption of greater risk? In this respect, the ICRC guidance is less helpful, suggesting that there is no obligation on the UK to assume any such risk (p.82). Goodman however characterizes this as an extremely conservative approach. He argues that an increased risk to troops in carrying out a less harmful attack should be placed in the balance when ascertaining which mode of attack complies with IHL. The Israeli Supreme Court's 2006 judgment in *PCATI v Israel,*[253] is authority for this:

> *"Arrest, investigation, and trial are not means which can always be used. At times the possibility does not exist whatsoever; at times it involves a risk so great to the lives of the soldiers, that it is not required…However, it is a possibility which should always be considered. It might actually be particularly practical under the conditions of belligerent occupation, in which the army controls the area in which the operation takes place, and in which arrest, investigation, and trial are at times realizable possibilities (see §5 of The Fourth Geneva Convention). Of course, given the circumstances of a certain case, that possibility might not exist. At times, its harm to nearby innocent civilians might be greater than that caused by refraining from it. In that state of affairs, it should not be used. Third, after an attack on a civilian suspected of taking an active part, at such time, in hostilities, a thorough investigation regarding the precision of the identification of the target and the circumstances of the attack upon him is to be performed (retroactively). That investigation must be independent.."*

Does the UK adopt the same approach to its use of drones? The statistics detailing prolific use of drones in Afghanistan suggest not. This, in our opinion, is unlawful.

4.19 In addition to preventing strikes where less harmful means could be deployed, the principle of humanity also prohibits successive drone strikes—such as the US practice of "second strikes"[254]—which may harm rescuers. It also prohibits any strikes that endanger civilian populations (see also the principle of distinction below). Again, not enough is known about UK drone strikes in this regard.

4.20 Other aspects of drones also suggest that they are liable to be deemed "inhuman". For example, how is a combatant able to surrender to a drone? As drones are able to survey their targets for considerable periods, should there not be a corresponding right for a combatant to surrender to the drone before he is killed? And how is any surrender to take place? The ICRC have noted this issue in its *Interpretive Guidance on the Notion of Direct Participation in Hostilities*, which states:

> *"While operating forces can hardly be required to take additional risks for themselves or the civilian population in order to capture an armed adversary alive, it would defy basic notions of humanity to kill an adversary or to refrain from giving him or her an opportunity to surrender where there manifestly is no necessity for the use of lethal force."*[255]

On the face of it, this rules out the use of drones for attacks in any situation other than one in which it is already known or reasonably assumed that a combatant would not surrender given the opportunity. Again, is this the UK's approach?

4.21 Similarly, how are civilians to be warned of a possible strike, so that they may vacate the area, as is required by Art 26 Hague IV? Such requirements of warning are not simply a relic of the past. A recent symposium of experts noted that "*effective advance warnings must be issued to the civilian population, unless circumstances do not permit...*",[256] noting that such requirements applied equally to drones.

4.22 Again, has the UK recognised and applied these issues, and what practices does it have as regards accepting surrender and warning civilian populations? Similar questions could be asked about the customary IHL rules such as Rule 112, requiring parties to a conflict to "*search for, collect and evacuate the dead without adverse distinction*" and Rules 115–117 requiring burying of the dead and recording of all available information

[252] *Supra,* note 47

[253] *PCATI v Israel* HCJ 769/02 (2006) (http://elyon1.court.gov.il/Files_ENG/02/690/007/A34/02007690.A34.pdf)

[254] J Serle, *"UN expert labels CIA tactic exposed by Bureau a war crime",* BIJ, 21 June 2012 (http://www.thebureauinvestigates.com/2012/06/21/un-expert-labels-cia-tactic-exposed-by-bureau-a-war-crime/)

[255] *Supra*, note 57, p.82

[256] *Manual on International Law Applicable to Air and Missile Warfare* (2009), Harvard International Humanitarian Law Research Initiative, Rule 37 (http://www.ihlresearch.org/amw/)

in relation to deaths and disappearances and provision of the same to family members. The distance between drone operator and victim renders these requirements of customary international humanitarian law very hard to achieve.

4.23 Furthermore, anticipating the introduction of fully autonomous drones, it should be argued strongly that the principle of humanity, with its subjective evaluation of the likely suffering, injury or destruction caused by a contemplated attack, requires human evaluation. Essentially, only humans can be the arbiters of humanity. Whilst artificial intelligence etc. may be able to quantify the relevant data, it cannot, properly form a view of what constitutes humane and inhumane conduct in a given situation. This decision is one based upon the human experience and all that this entails. As Vogel states: *"human judgment is often critical in exercising restraint in armed conflict"*.[257]

4.24 It is also possible that, even before autonomous drones are a reality, the "playstation mentality" that many argue affects drone operators also renders these weapons as inhumane. Drones are designed to eliminate emotion, adrenaline and human fallibility. If operators are desensitized to the human implications of a strike, then going ahead with such a strike risks contravening the humanity principle.

4.25 Recent reports have also highlighted the effect on civilian populations of being monitored by armed drones. They have noted severe psychological effects, particularly in children, of an awareness of being monitored and the constant risk of attack. Such effects also fall to be considered under the principle of humanity. Arguably, they would require, at the very least, the monitoring of such effects, limiting drone use in population areas, and a limiting of the number of strikes.

Distinction

4.26 The principle of distinction requires that attacks be directed only against combatants and military objectives, and not against civilians. Art 51 AP1 states as follows:

> *"The civilian population and individual civilians shall enjoy general protection against dangers arising from military operations."*

This reflects earlier Geneva Convention provisions, and is in turn reflected in the principles of customary international humanitarian law set out at para 4.8 above. It can be seen in specific IHL provisions, such as Art 25 of the 1907 Hague IV Convention, which prohibits aerial bombardment "by whatever means" of undefended towns, villages or dwellings.

4.27 Of course, the difficulty for the UK in the conflict in Afghanistan is that Taliban fighters are parts of their community, and may often intentionally fail to distinguish themselves from civilians. Nevertheless, if this tactic has been successful, UK forces cannot attack with drones. To do so would breach the principle of distinction.

4.28 Many IHL lawyers argue that the principle of distinction does not amount to an absolute prohibition on the taking of civilian life. Instead, it focuses attention on whether sufficient steps were taken to appropriately target an attack.[258] However, whether or not this is the case, the principle requires the taking of significant precautions. For example, Hague IV (reflected in customary international law) requires a commander to do "all in his power" to warn "authorities" before an aerial attack "except in cases of assault".

4.29 In the authors' opinion, the principle of distinction can and must be interpreted to require higher standards of distinction for the use of drones than, say, apply to artillery shells. Hand-in-hand with the benefits (and the disadvantages to a population) of constant, low risk, monitoring comes greater responsibility to use that technology appropriately. Commanders must make more than reasonable efforts to gather intelligence before they attack, they must be certain. If drones are capable of what the drones lobby claim, then certainty should be possible. A higher standard should apply to weapons that claim discernment. This is consistent with the guiding aim of IHL of protecting civilians. If a technology enjoys the ability to accurately discern civilians and targets prior to a strike, then it is no use comparing it to a cannonball or an artillery shell. If certainty, or near certainty is enabled, then the principle of distinction will require such certainty or near certainty. This is why, in an article broadly positive regarding drones' capabilities to fulfill IHL standards, Professor Laurie Blank states:

> *"In an age when the information-gathering capabilities of drones make extraordinary amounts of information available, it is reasonable to examine whether using drones adds any heightened standard for the use of information in analyzing targets, potential collateral damage and other considerations..."*[259]

This is also why Human Rights Watch commented in their 2009 report into drone attacks during Operation Cast Lead in the Gaza Strip that "*with..advanced visual capabilities, drone operators who exercised the proper*

[257] *Supra*, note 52, p.137

[258] eg MoD Manual on the Law of Armed Conflict, *supra,* note 47, para 2.5.3: "*This obligation is dependent on the quality of the information available to the commander at the time he makes decisions. If he makes* ***reasonable efforts*** *to gather intelligence, reviews the intelligence available to him and concludes in good faith that he is attacking a legitimate military target, he does not automatically violate the principle of distinction if the target turns out to be of a different and civilian character.*" It is submitted that this sets the bar too low.

[259] Blank LR, *After "Top Gun": How Drones Strikes Impact the Law of War* 33 U Pa J Int'l L 675 2011–2012)

degree of care should have been able to tell the difference between legitimate targets and civilians..."[260] Although the reverse argument—that inaccurate weapons should be given a greater margin of error—should be guarded against.

4.30 It should also be noted that the distance involved between operator and potential victim also has consequences for the principle of distinction. A drone operator is reliant on intelligence to a much greater extent than a soldier in the field, or even perhaps an aircraft under fire. Whilst their ability to see beyond the wall of a homestead in Afghanistan may be impressive, a drone operator, lacking first-hand experience, only knows to look into these buildings as a result of intelligence provided to him or her. And whilst a drone operator may easily see the number of individuals in such a compound, it cannot easily see who is carrying a weapon, who flees and who reaches for a weapon when the moment of combat arrives. The principle of distinction therefore requires drone operators to scrutinize and verify their intelligence and visual inputs to a much greater degree than presently appears to be the case from the statistics re. civilian casualties.

4.31 As with the other principles of IHL, it can also be argued that the principle of distinction requires human operation in order to make target assessment decisions. The principle should also be interpreted to prohibit the use of automated targeting drones.

4.32 There are a number of other characteristics of drones that raise a presumption that drone strikes will fall foul of the principle of distinction, particularly if used in any area in which civilians may be present (ie built areas or farming areas). For example, the time delay caused by transmitting data between operator and drone of 1–4 seconds raises considerable risks in any situation involving the possible presence of civilians in the vicinity (ie any targeting in a built-up or covered area). Similarly, the significant blast radii of hellfire missiles of upwards of 15–20 metres[261] may also raise a presumption that drone strikes are unlawful, particularly when considered alongside the other factors relating to the principle of distinction that we have identified. It was for such reasons that the ICRC opined in a similar fashion in relation to cluster munitions:

> *"these characteristics…raise serious question as to whether such weapons can be used in populated areas in accordance with the rule of distinction and the prohibition of indiscriminate attacks. The wide area effects of these weapons and the large number of unguided submunitions released would appear to make it difficult, if not impossible, to distinguish between military objectives and civilians in a populated target area."*[262]

4.33 Certain types of strikes can also be said to be prohibited absolutely by the principle of distinction. "Second strikes" for example that target rescuers. It is not currently known whether the UK has used multiple strikes.

4.34 We are bound to note the counter-argument however, that drones' ability to survey a target for hours or days at a time will lead to more accurately targeted attacks that more easily preserve civilian life. Used properly, this may be the case. But comparing drones to aircraft strikes is a false comparison. Attacks by jet fighters, which announce their presence loudly, and which take time to arrive at a target, will be much less likely to occur in a counter-insurgency conflict, precisely because of the risks of causing civilian casualties where combatants are among the civilian population. Comparing drones to a weapon which would not be used does not enhance drones' credentials. It is arguable that drones' "ability to linger" leads to greater damage than these sparingly used alternatives. The question is, simply, "does the prolific use of drones in Afghanistan comply with IHL?" not "are drones better or worse than another weapon?".

4.35 Of course, the correct application of the principle of distinction depends on correctly classifying "combatants" and "civilians". The groups were not expressly defined in the Geneva Conventions, which only set out criteria describing regular armed forces entitled to Prisoner of War status. In Additional Protocol 1, civilians are defined negatively as "all persons who are neither members of the armed forces of a party to the conflict nor participants in a levee en masse" (Art 50(1)). Armed forces are described as (Art 43) "*all organized armed forces, groups and units which are under a command responsible to that Party for the conduct of its subordinates, even if that Party is represented by a government or an authority not recognized by an adverse Party. Such armed forces shall be subject to an internal disciplinary system which, inter alia, shall enforce compliance with the rules of international law applicable in armed conflict.*"

4.36 The elements of organization, command structure, responsibility to a party to the conflict and internal discipline have lead to an assumption that the vast majority of targets in Afghanistan will not constitute armed forces.[263] However, in addition to members of armed forces, civilians "*taking an active part in hostilities*" may also be targeted under IHL. This is reflected in Art 51(3) AP1, which states:

> *"Civilians shall enjoy the protection afforded by this section, unless and for such time as they take a direct part in hostilities."*

[260] *Precisely Wrong: Gaza Civilians Killed by Israeli Drone-Launched Missiles*, Human Rights Watch (2009) (http://www.hrw.org/sites/default/files/reports/iopt0609web_0.pdf)
[261] *Supra,* note 55
[262] ICRC Observations on the Legal Issues Related to the Use of Cluster Munitions, UN Doc CCW/GGE/2007/WP.8
[263] See Noam Lubell, *Extraterritorial Use of Force Against Non-State Actors*, OUP, Oxford, 2011. p.139.

4.37 Drone operators must therefore accurately ascertain whether potential targets are either armed commanded groups or civilians taking a direct part in hostilities. Unless the answer is a clear one, then IHL prohibits the carrying out of a drone strike.

4.38 Similarly, civilian objects, such as homes and vehicles, cannot be targeted under IHL. Whether an object that is civilian in appearance has become a military object turns upon ascertaining whether the "*nature, location, purpose, or use*" of the object is military. Art 52(3) of AP1 states that if there is any doubt about an object's use, then it shall be presumed to be civilian in nature. Therefore without certainty through intelligence—a high standard to attain—objects that are civilian in appearance cannot be attacked. This includes homes, farms and vehicles.

4.39 As for civilians, as noted above, only those "taking a direct part in hostilities" may be targeted. What constitutes "taking a direct part in hostilities" is therefore a critical question, which affects the legality of a great number of UK drone attacks. But, just as for civilian objects, we do not know what rules the UK applies to this question. Afghan civilians are entitled to know; since they would wish to avoid engaging in conduct that may appear to drones overhead that they are "taking an active part in hostilities". This could include carrying arms in particular areas, or permitting Taliban sympathisers from their community to enter their homes, attending funerals etc.

4.40 There is no definition of what constitutes "direct participation in hostilities" in the main IHL treaties—the Geneva Conventions and Additional Protocols. This issue was explored by the Israeli Supreme Court in 2006 in *PCATI v Israel,*[264] which found that members of terrorist groups would never cease to take a direct part in hostilities. They could therefore be targeted at any time. For civilians who could not be so characterized, the court emphasized the question of whether or not such civilians are performing the "function" of combatants. It listed persons transporting combatants, or collecting intelligence on the opposing forces as sufficiently taking a direct part in hostilities (§35). However, it also stated that persons selling food or medicine to combatants, or providing general strategic analysis, monetary aid or distributing propaganda supporting them are not taking a direct part (§35).

4.41 The ICRC's guidance on the classification of civilians, the *Interpretive Guidance on the Notion of Direct Participation in Hostilities,*[265] was promulgated in 2009. This stated that civilians lose protection as long as they are "directly participating" in a specific hostile act, but that once such participation ceases, they regain protection. Of course, this raises the question of what constitutes "direct participation". The ICRC indicated that persons performing exclusively political, administrative or other non-combat functions are not participating in hostilities. It distinguished between acts which may well be hostile in that they are part of the general war effort or sustain the war, and acts which amount to direct participation in hostilities. This requires a direct causal link between the participation and harm ie "*if either the specific act in question, or a concrete and coordinated military operation of which that act forms an integral part, may reasonably be expected to directly—in one causal step—cause harm that reaches the required threshold [of harm].*"[266] However, even participation of that degree only satisfies the ICRC's standard if the act is a belligerent one ie the act is "***specifically designed*** *to directly cause the required threshold of harm in support of a party to the conflict and to the detriment of another.*" This excludes, for example, violent crime or acts of self defence.

4.42 And unlike members of organized armed groups, who are deemed to be exercising a "*continuous combat function*" and therefore are direct participants for the time that they remain part of the armed group; civilians "*who directly participate in hostilities on a merely spontaneous, sporadic, or unorganized basis, or who assume exclusively political, administrative or other non-combat functions"* are only able to be targeted for the time that they are directly engaged in hostilities (ie attacks).

4.43 Considering the ICRC's guidance, Vogel concluded as follows:

> *"It seems that if the ICRC's interpretation of direct participation in hostilities is used, then many of the United States' drone strikes may not properly distinguish between combatant and civilian—particularly those attacks against 'civilians' (eg members of…Taliban, and associated forces who perform only political, religious, or other 'non-combat' functions for the group) located in their homes. However, if one concludes that membership in an inherently violent non-state armed group within a recognized armed conflict severs an individual's civilian protected status, then drone strikes that target such individuals likely meet the requirement to distinguish..."*[267]

Clearly, this is a vexed question, the US' answer to which has been heavily criticized. For example, Hina Shamsi notes that the US has argued that drug traffickers linked to the Taliban can be targeted and killed.[268] However, it is not known whether the UK takes a similarly expansive approach to military objects and participation in hostilities or not. Nor is it known whether the UK's policy employs the same, or different distinctions to those found by the Israeli Supreme Court or those found by the ICRC. Nor is it known whether public references to "insurgents" reflect different, or the same, standards applied under IHL to combatants and

[264] *Supra*, note 60
[265] *Supra*, note 52, at p. 122
[266] Shamsi, *Remarks*, 104 Am Soc'y Int'l L Proc 165 2010
[267] *Supra*, note 52, at p. 122
[268] Shamsi, *Remarks*, 104 Am Soc'y Int'l L Proc 165 2010

civilians directly participating in hostilities. Any classification of combatants and "civilians participating in hostilities" that strays wider than the ICRC's guidance is, it is submitted, a misdirection in law and unlawful.

4.44. A Parliamentary question has been raised regarding the UK's policy on this matter, which received the following answer:

> *"The Parliamentary Under-Secretary of State, Ministry of Defence (Lord Astor of Hever): Within the context of the operational environment in Afghanistan, we report the number of casualties that are caused by UK forces' actions, whether these are civilian or insurgent casualties, as accurately as practicable.*
>
> *The Ministry of Defence does not, as a matter of course, monitor overall insurgent or civilian casualty figures. However, in all circumstances where a possible civilian casualty is reported, UK forces will investigate the circumstances. The presumption of that investigation will be that any casualty is a civilian unless it can be established that the individual was directly involved in immediate attempts or plans to threaten the lives of International Security Assistance Force personnel."*[269]

This policy does not appear to be enough to satisfy the above concerns, as it is reliant on the reporting of a possible civilian casualty. If an assumption of "combatant" has already been made pre-strike, then it is unlikely that this assumption will change post-strike, save in the most obvious cases of collateral damage. Whilst the emphasis on immediacy does go some way to suggesting that the definition of "direct participation" is close to the ICRC's, it may still be wider. The ICRC emphasizes the need for a direct, one step, causal link to harm to ISAF forces. And the reference to "attempts or *plans*" raises concerns as to what the UK deems to constitute planning. Could attending a *Jirga* (community meeting) at which some express opposition to ISAF forces constitute planning? Or logging onto a jihadist website? Nor does this answer the question of how the UK applies its own definition. Where does it draw the line as to "direct involvement"? Close scrutiny of the UK's definition of "direct participation in hostilities" is required.

4.45 Clearly, there is a strong incentive for the UK to class all casualties as "insurgents"/"combatants" *ex-post facto*, and not as civilians. Certainly, in the absence of adequate post-strike investigations (and again, the UK's approach to such a critical matter is unknown) it is easy to see how an assumption of "'combatant' unless there is clear evidence to the contrary", could develop. In light of the evidence—hundreds of drone strikes and only four deemed civilian deaths—we posit that the UK has misdirected itself as to who may be a civilian under IHL and the extent of its duties to investigate and ascertain.

4.46 And, once again, all of the above places a great deal of pressure on intelligence. This is acknowledged by Vogel, who states: "*there may also be concern with drone strikes' dependency on reliable intelligence for acquisition of targets*."[270] Although he notes that this pressure is not unique to drones. Nevertheless, given the absence of any other sources of information for a drone operator (other than visual inputs, which he or she will usually require intelligence to interpret), the pressure is particularly acute in relation to drones.

Proportionality

4.47 The principle of proportionality involves a balancing of the effect of any attack with the military aim involved, in order to prohibit disproportionate "sledgehammer to crack a nut" attacks. See Art 51(5) AP1:

> *"Among others, the following types of attacks are to be considered as indiscriminate:…[a]n attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated."*

Crudely, the principle permits attacks that cause civilian casualties if the ends justify the means. This is reflected in the Rome Statute of the International Criminal Court, which criminalizes only the causing of civilian death and destruction that is "excessive" compared to the anticipated military advantage. However, where such interpretations start to dilute the principle of discrimination they should be resisted. Furthermore, the claimed superior discrimination of drones can be relied upon to argue for heightened proportionality standards such that any civilian casualties amount to a disproportionate attack. Blank alludes to this:

> *"proportionality in the context of UAV strikes is being, or could soon be, reconfigured, that we are seeing a recalibration of the relationship between military advantage and civilian casualties—away from 'excessive' and towards 'none'."*[271]

4.48 Furthermore, UK drone operators will also need to be in possession of very good intelligence in order to be in a position to make a decision as to proportionality. For example, Art 57(1) AP1 requires that "*in the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.*" Indeed, Art 57(2)(c) AP1 requires that advance warnings of attack are given to civilian populations "*of attacks which may affect the civilian populations, unless circumstances do not permit this*."

[269] *Hansard,* HL Deb 13 November 2012 c261WA
[270] *Supra,* note 52, p.124
[271] *Supra,* note 66, p.715

4.49 The principle of proportionality, in balancing military advantage, should also require an evaluation of the seniority and strategic importance of the personnel to be targeted. It could be argued that only senior personnel may be targeted by drone attack, given the attendant risks of breaches of IHL that we have highlighted. This finds support in an unlikely place, the US Army Field Manual, which states:

> *"In COIN [counter-insurgency] environments, the number of civilian lives lost and property destroyed needs to be measured against how much harm the targeted insurgent could do if allowed to escape. If the target in question is relatively inconsequential, then proportionality requires combatants to forego severe action, or seek noncombative means of engagement."*[272]

Vogel also alludes to this issue, stating:

> *"Determining whether drone strikes meet the requirements of proportionality will always be a case-by-case analysis. Higher numbers of civilian casualties may meet the proportionality test, for example, if the target is a very senior leader of the enemy whose elimination may more likely lead to a quicker cessation of hostilities and fewer military and non-military deaths. On the other hand, striking low-level fighters or supporters in public places, where collateral damage is virtually assured, may not meet the test."*[273]

4.50 Again, as with the principle of distinction, it is not known whether the UK adopts this approach in relation to its drone strikes, but given their high numbers, it appears unlikely that it is being applied correctly.

4.51 And again, as with the principle of humanity, that of proportionality also requires a human operator. Autonomous drones should fall foul of this standard. Professor Noel Sharkey[274] states that "*there is no way for a robot to perform the human subjective balancing act require to make proportionality decisions*", stating that it is very difficult to "*calculate a value*" for the military gains for any given attack.

Enforcement

4.52 The above survey demonstrates that IHL standards do have an important role to play in regulating drone use. We have also made clear that there is a severe shortage of information regarding the UK's use of drones in Afghanistan. Nevertheless, considering the intensive use of UK drones for targeted killing in Afghanistan (see statistics at para 2.2 above) it is possible to conclude in the abstract that it is highly likely that the UK's use of drones in Afghanistan will have breached the relevant core standards of IHL—of *humanity*, *proportionality*, *necessity* and *distinction*. For example, applying the principle of *humanity*, drones may only be used when targets may not be disabled or arrested by other means, even if such alternative means involve a greater risk to UK troops. And the UK should have given adequate warning to civilian populations of imminent attack. And applying the principle of *distinction*, particularly an elevated standard in view of the claimed precision of drone strikes, drone attacks should not target nor affect civilians or potentially civilian persons or objects. The incident involving the mistaken killing of a British serviceman through drone misidentification (see para 2.3 above) starkly illustrates the dangers. And any civilians who are not directly participating in hostilities (adopting the ICRC's guidance) should not in any event be targeted. eg not religious personnel or Taliban supporters etc.

4.53 These IHL standards are customary international law standards. In the absence of a statutory bar to incorporation, they form part of English law and may be adjudicated upon in English Courts (*see Trendtex Trading Corporation v Central Bank of Nigeria [1977] 1 QB 529*). Furthermore, given the UK Government's policy adoption of these IHL standards (see for example the Ministry of Defence Manual on the Law of Armed Conflict), the Courts may review the Government's compliance with its own policy, essentially as a species of legitimate expectation. This was the exercise the Court undertook in relation to Geneva Convention standards in *R (Haidar Ali Hussein) v SSD* [2013] EWHC 95 (Admin) (on appeal), summarized by Collins J at §20:

> *"The second ground is based on an alleged failure to abide by the requirements of the Geneva Conventions, insofar as they are applicable. They are, it is submitted, part of international law which is incorporated into domestic law…In the skeleton arguments, there has been much learning on whether the Conventions are to be regarded as incorporated into domestic law. The observations of Lord Denning, MR in Trendtex Trading Corporation v Central Bank of Nigeria [1977] 1 QB 529, upon which Mr Owen particularly relies, are at p.554G. He concludes that 'the rules of international law, as existing from time to time do form part of our English law'. But there has not been universal acceptance of this in subsequent cases. However, it is not in my view necessary to determine the question. It is clear from the policies that the Defendant has accepted that CPERS must be treated in accordance with any applicable Geneva Convention and must in particular be treated at all times in a humane fashion. Thus whether the obligation to treat CPERS in such a manner applies as a matter of law does not need to be determined since as a matter of fact the Defendant has decided to do so. Any failure to comply with relevant obligations would constitute a breach of the approach that the Defendant is applying and so would be unlawful in public law terms."*

4.54 There is an urgent need for the English Courts to review the UK's policy and practice in relation to its drone programme in Afghanistan, whether as a matter of policy and generality or with reference to a particular

[272] US Army US Marine Corps Countersurgency Field Manual, 2009, p.7–7
[273] *Supra*, note 52.
[274] Sharkey, *Saying "No" to Lethal Autonomous Targeting,* Journal of Military Ethics 369

strike. This was essentially the exercise that the Israeli Supreme Court carried out in relation to targeted killings in the Occupied Palestinian Territories in the *PCATI* case cited above. The English courts may also carry out this exercise, just as they did in *Haidar Ali Hussein.*

5. Legality of use in Afghanistan under IHRL

5.1 Of course, IHL is not the only body of law of potential application to the UK's drones programme. International Human Rights Law (IHRL) protects victims from the unlawful use of force and requires investigation wherever credible allegations of a breach are made. The UN Special Rapporteur, Philip Alston summarises the criteria of human rights law in determining whether a use of force was lawful:

> *"Under human rights law: a State killing is legal only if it is required to protect life (making lethal force proportionate) and there is no other means, such as capture or nonlethal incapacitation, of preventing that threat to life (making lethal force necessary).The proportionality requirement limits the permissible level of force based on the threat posed by the suspect to others. The necessity requirement imposes an obligation to minimize the level of force used, regardless of the amount that would be proportionate, through, for example, the use of warnings, restraint and capture."*[275]

5.2 In the UK context, the applicable human rights protections are most clearly found in the European Convention on Human Rights (ECHR).

5.3 Almost all commentators have deemed international human rights law to only apply to drone strikes occurring outside conflict zones (ie the US' programme). Some rely on the opinion of the ICJ in its *Nuclear Weapons* opinion,[276] in which it stated that (§25):

> *"whether a particular loss of life, through the use of a certain weapon in warfare, is to be considered an arbitrary deprivation of life contrary to Article 6 ICCPR, can only be decided by reference to the law applicable in armed conflict".*

However, in *Congo v Uganda,*[277] the ICJ held that both bodies of law—IHL and IHRL—are capable of application to the acts of states engaged in armed conflict. At §216, the ICJ stated as follows, citing its earlier Advisory Opinion on the Construction of a Wall in the Occupied Palestinian Territory:

> *"216. The Court first recalls that it had occasion to address the issues of the relationship between international humanitarian law and international human rights law and of the applicability of international human rights law instruments outside national territory in its Advisory Opinion of 9 July 2004 on the Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory. In this Advisory Opinion the Court found that:*
>
> > *'the protection offered by human rights conventions does not cease in case of armed conflict, save through the effect of provisions for derogation of the kind to be found in Article 4 of the International Covenant on Civil and Political Rights. As regards the relationship between international humanitarian law and human rights law, there are thus three possible situations: some rights may be exclusively matters of international humanitarian law; others may be exclusively matters of human rights law; yet others may be matters of both these branches of international law.' (I.C.J. Reports 2004 ,p. 178, para. 106.)*
>
> *It thus concluded that both branches of international law, namely international human rights law and international humanitarian law, would have to be taken into consideration."*

The ICJ went on to hold Uganda responsible for violations of both IHL and IHRL in that case.

5.4 Most pertinently in relation to the UK, the Grand Chamber of the European Court of Human Rights (ECtHR) also applied the ECHR to the actions of UK forces in Iraq in *Al-Jedda v United Kingdom* [2011] ECHR 1092, *Al-Saadoon v United Kingdom* 61498/08 [2010] ECHR 282 and *Al-Skeini v United Kingdom* (55721/07) (2011) 53 EHRR 18.

5.5 In *Al-Skeini*, the ECtHR found that UK human rights jurisdiction extended to individuals affected by the UK's conduct in Iraq. The ECtHR held that individuals killed whilst under the authority and control of UK forces were within the UK's jurisdiction for the purposes of the ECHR. Such authority and control arose in relation to any Iraqi civilians killed during the carrying out of security operations in the UK's area of responsibility. All such individuals were thus protected by the right to life enshrined in Art 2 ECtHR and relatives were entitled to investigations of their relatives' deaths pursuant to the procedural duty that protects the right. A further case, *Hassan v UK*, concerning the arrest and disappearance of an Iraqi civilian taken under British control in Iraq in 2003, is to go before the Grand Chamber in due course.

5.6 In *Al-Jedda,* the ECtHR found the right to liberty under Art 5(1) ECHR and the procedural protections under Art 5(4) ECHR were not ousted by, and effectively overrode, the power to intern civilians arising under IHL and UN Security Council Resolutions.

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[275] *Supra*, note 42.
[276] *Supra,* note 33.
[277] *Case Concerning Armed Activities on the Territory of the Congo (DRC v Uganda)* ICJ (2005), p.168

Human Rights Jurisdiction

5.7 Again, it is not known whether the UK applies human rights standards to the operation of its drones programme, although it would appear not, given the high level of drone use recorded in the statistics cited at the beginning of this opinion. It is anticipated that the UK will raise a series of barrier arguments in a bid to avoid human rights accountability for its drones programme. In the first case challenging UK activities in Afghanistan—*R (Evans) v Secretary of State for Defence* [2010] EWHC 1445 (Admin) (which challenged the practice of handing-over prisoners to torture in Afghanistan)—the Ministry of Defence avoided litigating these barrier issues by promulgating a policy replicating the ECHR standards so that the Court could review the Government's compliance with the policy instead. Perhaps it was felt that the facts of the case would compel the Court to find human rights jurisdiction and it was better to argue these points on different facts. That opportunity is likely to present itself shortly in current cases such as *R (Noorzai) v SSD* (hearing pending).

5.8 An in-depth analysis of the various barrier arguments that the UK Government is likely to erect to prevent the application of human rights law is beyond the scope of this opinion. They are familiar from the cases of *Al- Jedda, Al-Skeini* and *Al-Saadoon*, which related to Iraq, and in all of which the ECtHR rejected the UK's attempts to evade accountability.

5.9 However, one barrier argument directly concerns drones themselves and is worth considering in more depth. ECHR Art 1 requires a victim to have been within the jurisdiction of the UK before he/she can benefit from the rights in the convention. In most cases such jurisdiction is territorial, as the incident in question occurs in the UK. However, jurisdiction is not exclusively territorial (see *Bankovic v Belgium* 11 BHRC 435 at §§61, 67; and Al-Skeini §§131–132). The Grand Chamber in Al-Skeini recognised a number of exceptions to the territoriality principle, including when *"the use of force by a State's agents operating outside its territory may bring the individual thereby brought under the control of the State's authorities into the State's Article 1 jurisdiction"* (§136). It is not necessary in such circumstances for the state to be in a position to guarantee all of the convention rights to that individual, but must guarantee *"the rights…that are relevant to the situation of that individual"* (§137).

5.10 The Grand Chamber also found in Al-Skeini that ECHR jurisdiction would flow when "as a consequence of lawful or unlawful military action, a Contracting State exercises effective control of an area outside that national territory" (§138). In those circumstances the state has the responsibility to secure all of the convention rights within the territory under its control (§138).

5.11 The Grand Chamber in Al-Skeini concluded that the UK had exercised ECHR jurisdiction in Iraq. This had been exercised "through its soldiers engaged in security operations in Basrah during the period in question" (§149). They had "exercised authority and control over individuals killed in the course of such security operations, so as to establish a jurisdictional link between the deceased and the United Kingdom for the purposes of Article 1 of the Convention" (§149). Also relevant was the fact that "the UK (together with the US) assumed in Iraq the exercise of some of the public powers normally to be exercised by a sovereign government. In particular, the United Kingdom assumed authority and responsibility for the maintenance of security in South East Iraq." (§149) Those security roles are summarized at §§21 and 147 of the judgment:

> *"The principal security task was the effort to re-establish the Iraqi security forces, including the Iraqi police. Other tasks included patrols, arrests, anti-terrorist operations, policing of civil demonstrations, protection of essential utilities and infrastructure and protecting police stations. The second main function of British troops was the support of the civil administration in Iraq in a variety of ways, from liaison with the Coalition Provisional Authority and Governing Council of Iraq and local government, to assisting with the rebuilding of the infrastructure."* (§21)

5.12 These roles are very similar to the roles undertaken by British troops in Afghanistan, provided for in successive UN Security Council Resolutions beginning with UNSCR 1386 of 2001 which, *inter alia*, authorized the establishment of an "*International Security Assistance Force [ISAF] to assist the Afghan Interim Authority in the maintenance of security in Kabul and its surrounding areas, so that the Afghan Interim Authority as well as the personnel of the United Nations can operate in a secure environment*" (UNSCR 1386 §1) and authorized that force "*to take all necessary measures to fulfill its mandate*" (§3). UNSCR 1386 also notes the UK's offer to take the lead in organizing and commanding the ISAF.

5.13 Assuming therefore that the requisite degree of authority is exercised by UK forces operating in Afghanistan, through the UN mandate and its use of drones and ground forces (if necessary together with other nations' forces, as in Iraq), the question is whether the UK exercises the requisite degree of control over drone victims. Such control need not be exercised in a physical sense. For example, the third applicant in *Al-Skeini* died whilst eating dinner with her family, when bullets fired by unseen assailants entered her home through the wall and killed her (*Al-Skeini* §44). The Grand Chamber found that the requisite degree of control was exercised over her as she had been killed during security operations (§149, above). Provided therefore that drone operations are recognised as security operations, there is no reason of principle why the use of a drone to attack an individual cannot found a similar degree of control and thus establish a similar jurisdictional link with the victims.

5.14 The earlier Grand Chamber case of *Bankovic* found that no jurisdictional link was established by high altitude bombing in Serbia. However, whilst *Al-Skeini* did not expressly reverse *Bankovic* save in certain specific areas (the concepts of "*espace juridique*" and the inability to "divide and tailor" ECHR rights extra-territorially), it has replaced it as the authority on extra-territorial jurisdiction. Moreover, there is a significant difference between the bombing raids in *Bankovic*, in which such a premium was placed on avoiding NATO losses that planes were not permitted to fly below fifteen thousand feet, and drone attacks in Afghanistan occurring as part of UN-sanctioned security operations, accompanied by the actions of British forces on the ground and occurring as a result of intensive and prolonged surveillance of the targets. The characteristics of drones as compared to high altitude aircraft bombing also urge a finding of ECHR jurisdiction. The close monitoring of the target by the drone operator; his/her ability to call-off a strike if he/she believes civilians are in the area; and the claimed ability to carry out surveillance of targets for days at a time, together with the contemporaneous recording of all this information (which can be readily reviewed for the purposes of investigation), creates a much stronger degree of control over the target than that found in *Bankovic*, indeed stronger than that of the third applicant in Al-Skeini. The Grand Chamber in *Al-Skeini* can be seen to clearly reject the idea of jurisdictional "red lines" (the arbitrary nature of the "inside/outside British bases" concept favoured by the UK was specifically put to the UK by Judge Ann Power at the hearing) in favour of a factual analysis. That includes temporal red lines as well as geographical ones. It would be unnecessarily inflexible to suggest that, in this era of drone warfare, ECHR rights are irrelevant simply due to the fact that the weapon is fired from the air rather than the ground.

5.15 This conclusion is also consistent with the views of others concerning the application of the ICCPR, another human rights treaty, to US drone attacks occurring outside Afghanistan. The UN Special Rapporteur, Philip Alston declared in his study of the use of drones for targeted killings in May 2010 that "*the legality of a killing outside the context of armed conflict is governed by human rights standards, especially those concerning the use of lethal force*."[278]

He recognised no limitation on the application of the ICCPR to drone victims. Of course, his limitation of this to killings occurring outside armed conflict should be recognised as occurring prior to the Grand Chamber's decision in *Al-Skeini*, which expressly applies human rights standards to killings occurring during a period of occupation and armed conflict.

5.16 Of course, the UK is also a signatory to the ICCPR and it may also be enforced in domestic courts where reflective of customary international law or otherwise held to impose public law obligations. However, the ECHR is directly incorporated into English law and is therefore the more relevant human rights standard.

Human Rights Protections

5.17 In light of the above, persons targeted by British drones in Afghanistan should benefit not only from the protections of IHL but also human rights law. The effect of this is significant, as targeted killings are unlawful under human rights law. Intentional lethal force is only permitted to protect against a threat to life, and where there are no other means—including detention or disablement—of preventing that threat to life. Article 2 of the ECHR states as follows:

> *"**Article 2—Right to life***
>
> *1. Everyone's right to life shall be protected by law. No one shall be deprived of his life intentionally save in the execution of a sentence of a court following his conviction of a crime for which this penalty is provided by law.*
>
> *2. Deprivation of life shall not be regarded as inflicted in contravention of this article when it results from the use of force which is no more than absolutely necessary:*
>
> *(a) in defence of any person from unlawful violence;*
>
> *(b) in order to effect a lawful arrest or to prevent the escape of a person lawfully detained;*
>
> *(c) in action lawfully taken for the purpose of quelling a riot or insurrection."*

5.18 In *McCann v United Kingdom* (1995) 21 EHRR 97, the ECtHR considered the targeted killing of three IRA personnel in Gibraltar. It held that Art 2 ECHR required that (§§149–150):

> *"the force used must be **strictly proportionate to** the achievement of the aims set out in sub-paragraphs 2 (a), (b) and (c) of Article 2…In keeping with the importance of this provision (art. 2) in a democratic society, the Court must, in making its assessment, subject deprivations of life to the most careful scrutiny, particularly where deliberate lethal force is used, taking into consideration not only the actions of the agents of the State who actually administer the force but also all the surrounding circumstances including such matters as the planning and control of the actions under examination."*

5.19 The ECtHR went on to exercise careful scrutiny of the targeted killing operation, observing that (§211) "…the authorities were bound by their obligation to respect the right to life of the suspects to exercise the greatest of care in evaluating the information at their disposal before transmitting it to soldiers whose use of

[278] *Supra,* note 42, §31

firearms automatically involved shooting to kill." And that (§203) "It may be questioned why the three suspects were not arrested at the border immediately on their arrival in Gibraltar." The ECtHR concluded that: (§213):

> *"In sum, having regard to the decision not to prevent the suspects from travelling into Gibraltar, to the failure of the authorities to make sufficient allowances for the possibility that their intelligence assessments might, in some respects at least, be erroneous and to the automatic recourse to lethal force when the soldiers opened fire, the Court is not persuaded that the killing of the three terrorists constituted the use of force which was no more than absolutely necessary in defence of persons from unlawful violence within the meaning of Article 2 para. 2 (a) (art. 2–2-a) of the Convention."*

5.20 In *Al-Skeini* the Grand Chamber recognized that the deaths in question occurred during occupation in which conditions of armed conflict prevailed (§161). However, citing *McCann,* it reiterated that conditions of armed conflict did not disapply Art 2 ECHR, save where a derogation was entered under Art 15 ECHR. It stated that (§162) "*Article 2 covers both intentional killing and also the situations in which it is permitted to use force which may result, as an unintended outcome, in the deprivation of life. Any use of force must be no more than 'absolutely necessary' for the achievement of one or more of the purposes set out in sub-paragraphs (a) to (c)"*.

5.21 The requirement to use "no more [force] than absolutely necessary" in Art 2(2) places a significant restriction on drone use. Only when it is absolutely necessary to kill someone rather than arrest/disable them will the use of drones be lawful. And even then, drones may only be used for one of the purposes in Art 2(2), most relevantly, in self defence under Art 2(2)(c).

Provided therefore that UK jurisdiction for the purposes of the ECHR is established, then the application of the ECHR would limit the use of drones solely to situations in which there is an immediate threat to life. This prevents the carrying out of "targeted killings" and narrowly circumscribes their use even on "the battlefield".

5.22 It is also notable that Art 2 ECHR makes no distinction between combatants and civilians and whether or not they are participating in hostilities. All persons within the jurisdiction of the UK benefit from its protections. Combatant status/participation in hostilities is only relevant to the extent that it may inform the question of whether a drone strike fell into the narrow category of instances in which the use of force to take a life was "absolutely necessary" and related to one of the purposes set out in Art 2(2).

5.23 Not only does the application of Art 2 ECHR narrowly circumscribe the circumstances in which drones may be used, Art 2 ECHR also imposes a number of positive duties on the state. Most importantly, the state is required to investigate any "arguable" (*Sahin v Turkey* (App No 7928/02)) breach of Art 2 ECHR. It must not await a complaint but investigate proactively of its own volition. Such investigations must be effective, independent, sufficiently prompt, subjected to public scrutiny and permit the victims to participate (*Al-Skeini* §§163–167). The investigation must be broad enough to address "systemic" questions (ie. broader issues of state responsibility: system, management and culture; instructions, training and supervision).

5.24 It is not known how the UK is currently investigating its drone strikes. The single incident recorded in Parliamentary answers (see para 2.3 above) referred only to an ISAF investigation. It is not known whether the Royal Military Police also carried out an investigation, in accordance with their statutory duties under the Armed Forces Act 2006. However, the adequacy of Royal Military Police investigations have been called into question by the decisions in *Al-Skeini* and in domestic judicial review litigation such as *R* (*Al- Sweady & ors) v SSD* [2009] EWHC 2387 (Admin) and *R* (*Ali Zaki Mousa) v SSD* [2011] EWCA Civ 1334. The most recent judgment *R (Ali Zaki Mousa (No.2)) v SSD* found that an inquest equivalent procedure was required for all deaths in Iraq. The conclusion of the investigation stated in Parliament, that the civilian deaths had been caused "in accordance with extant procedures and ISAF rules of engagement", is startlingly similar to the investigative conclusions in these cases, which were later found to be inadequate. The answer also suggests an unduly narrow approach to the investigation which does not take account of the legal constraints we highlight in this opinion.

5.25 A state of armed conflict does not absolve the state from carrying out such an investigation. The Grand Chamber stated in *Al-Skeini* (§164):

> *".... the procedural obligation under Article 2 continues to apply in difficult security conditions, including in a context of armed conflict... It is clear that where the death to be investigated under Article 2 occurs in circumstances of generalised violence, armed conflict or insurgency, obstacles may be placed in the way of investigators and, as the United Nations Special Rapporteur has also observed (see paragraph 93 above), concrete constraints may compel the use of less effective measures of investigation or may cause an investigation to be delayed... Nonetheless, the obligation under Article 2 to safeguard life entails that, even in difficult security conditions, all reasonable steps must be taken to ensure that an effective, independent investigation is conducted into alleged breaches of the right to life (see, amongst many other examples, Kaya v. Turkey, 19 February 1998, §§ 86–9...)."*

5.26 Art 2 ECHR also imposes other positive obligations upon the state in relation to drone victims. The State has a positive obligation to protect individuals from harm, by taking appropriate steps to safeguard life, and reasonable and effective measures to avoid a risk of arbitrary deprivation of life. In the context of drones, for example, this may require the publishing of the targeting policy, or prior notification to civilians where

attacks are contemplated in built-up areas. These measures might be said to undermine the effectiveness of drones. However, greater consideration needs to be given to measures that would enable civilians to avoid being affected by drone use.

5.27 Art 2 ECHR may also impose requirements of transparency in relation to the UK's drones programme. The UN Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions has stated as follows, citing ICCPR and Inter-American Court of Human Rights jurisprudence:

> *"87. The failure of States to comply with their human rights law and IHL obligations to provide transparency and accountability for targeted killings is a matter of deep concern. To date, no State has disclosed the full legal basis for targeted killings, including its interpretation of the legal issues discussed above. Nor has any State disclosed the procedural and other safeguards in place to ensure that killings are lawful and justified, and the accountability mechanisms that ensure wrongful killings are investigated, prosecuted and punished. The refusal by States who conduct targeted killings to provide transparency about their policies violates the international legal framework that limits the unlawful use of lethal force against individuals."*[279]

5.28 ECHR caselaw lends some support to this. The Grand Chamber of the ECtHR recently recognized the "right to the truth", in a case concerning rendition to torture (*El-Masri v Macedonia (App. No. 39630/09, 13.12.12)*). Following intervention from the UNHCR:

> *"the right to the truth was an autonomous right triggered by gross violations, as in the case of enforced disappearances…Knowing the truth about gross human rights violations and serious violations of humanitarian law afforded victims, their relatives and close friends a measure of satisfaction.…"*

The ECtHR adopted this language in its conclusions (§191).

5.29 Lastly in the context of Art 2 ECHR, it should not be forgotten that the UK also has a duty to provide reparation to victims of drone strikes that breach the Art 2 ECHR standards.

Other rights

5.30 Although Art 2 ECHR is most relevant, studies have shown that drone use affects not only communities' fundamental right to life, but also their mental health; educational opportunities; burial traditions and willingness to attend funerals; their economic, social and cultural activities; community trust; and their willingness to rescue victims and provide medical assistance. See the Stanford-NYU Report, "Living Under Drones",[280] which makes clear the debilitating effect on whole communities of the constant low level fear that living under the shadow of drones entails. As such, the rights to be free of torture and mistreatment (including psychological mistreatment) (Art 3 ECHR); and their rights to privacy (Art 8 ECHR), freedom of conscience and religion (Art 9 ECHR), of expression (Art 10 ECHR) and association (Art 11 EHCR) may all be engaged by the UK's use of drones in Afghanistan.

Enforcement

5.31 Pursuant to s7 Human Rights Act 1998, ECHR rights are directly enforceable by victims against the Ministry of Defence in the English courts.

6. Other Potential Unlawfulness

6.1 We have set out above potential actions against the British government for breach of customary international humanitarian law and human rights law in respect of its use of drones. We consider below further potential means of legal redress.

6.2 *Information*: as we have described, one of the principle mischiefs of the UK's use of drones is its lack of transparency regarding the UK's drones programme. Much of the preceding debate has taken place in the abstract, because so little is known about the UK's use of drones. There are serious concerns that the UK has failed to adequately analyse the effects of its use of drones and that its (presumed) conclusions as to the legality of their use are unsafe.

6.3 We have set out above how the ECHR investigative duty and the right to truth described in *El-Masri* may assist in this regard, particularly when coupled with the Government's duty of candour in judicial review proceedings. Existing means of obtaining information, such as through the Freedom of Information Act 2000 and Parliamentary questions, has not permitted an adequate level of scrutiny.

6.4 It is possible that the Government's lack of transparency regarding its decision to deploy UK-controlled drones in Afghanistan (and associated decisions), may also breach public law principles. Publication of the legal basis, its considerations of the many legal issues identified above, and its operational rationale for drone use all would greatly advance public debate and are matters of significant public interest.

[279] ???
[280] ???

6.5 There is no general common law duty to provide reasons for decisions. However, given the effect on fundamental human rights set out above, it could be argued that the current level of public reasoning fails to comply with a public law duty to give reasons in such particular cases. For example, the High Court found a duty to give reasons in a sensitive human rights context in *R v DPP ex parte Manning* [2001] QB 330, which concerned a prosecutor's decision not to prosecute persons following an inquest. Lord Bingham held as follows (§33):

> *"It is not contended that the Director is subject to an obligation to give reasons in every case in which he decides not to prosecute…But the right to life is the most fundamental of all human rights. It is put at the forefront of the Convention. The power to derogate from it is very limited…In the absence of compelling grounds for not giving reasons, we would expect the Director to give reasons in such a case: to meet the reasonable expectation of interested parties that either a prosecution would follow or a reasonable explanation for not prosecuting be given, to vindicate the Director's decision by showing that solid grounds exist for what might otherwise appear to be a surprising or even inexplicable decision and to meet the European Court's expectation that if a prosecution is not to follow a plausible explanation will be given."*

6.6 In R (Saleh Hasan) v Secretary of State for Trade & Industry [2008] EWCA Civ 1312, the Court of Appeal reiterated that there was no general duty to provide reasons, even in the human rights context of arms exports to Israel. However, this case may be distinguished on the basis that the Court found that the claimant was not liable to be affected by the arms export licensing decisions in question. A case brought on behalf of a person affected by the UK's drones programme may avoid such a hurdle. Further, the Defendant in *Hassan* was able to rely upon Parliamentary review of the licensing decisions in question, which is of lesser application in the context of drones. Finally, the Court also emphasized that publication of licensing decisions after the fact would not enable anyone to challenge them. However, publication of details of the UK's drones programme may enable challenge.

6.7 *Breach of Policy:* At para 3.10 above described the UK's policy regarding the adoption of new weapons systems. An inadequate weapons review may constitute insufficient inquiry of the decision maker. Under the *Tameside* duty, the Government is *under a duty to "ask himself the right question and take reasonable steps to acquaint himself with the relevant information to enable him to answer it correctly" (Secretary of State for Education and Science v Tameside Metropolitan Borough Council* [1977] AC 1014 at 1065B). This may require him to elicit outside views. But in any event, "reasonable steps" would include analyzing the issues highlighted in this opinion.

6.8 *UK Complicity in third states' drones programmes:* a consideration of the issues associated with the UK's complicity in other states' drones programmes is outside the scope of this opinion. However it is noted here for completeness. See *R (Noor Khan) v Secretary of State for Foreign & Commonwealth Affairs* [2012] EWHC 3728 (Admin).

6.9 *War crimes*: willful killing or causing of serious injury in breach of IHL is a war crime under Art 8 (2)(a)(i) of the Rome Statute of the International Criminal Court. Intentionally directing attacks against the civilian population , civilians not taking a direct part in hostilities, or civilian objects is a war crime under Art 8(2)(b)(i),(ii),(iv) and Art 8(2)(e)(i). Attacks causing incidental civilian damage that is clearly excessive in relation to the concrete and direct military advantages is a war crime under Art 8(2)(b)(iv). Killing or wounding a combatant who has surrendered is a war crime under Art 8(2)(b)(vi). These crimes are incorporated into domestic law in the International Criminal Court Act 2001.

6.10 Although criminal accountability is outside the scope of this opinion, it follows from our analysis of the UK's compliance with IHL that war crimes may have been committed by the UK in its use of drones in Afghanistan. Prosecutors should be invited to investigate these matters.

7. Conclusion

7.1 Whilst we acknowledge the limited evidence that is available regarding the UK's use of drones, we have considered the available information as to their prolific and increasing use in Afghanistan. David Cameron said in December 2010 that 124 "insurgents" had been killed by drones, at a time when FOIA responses suggest that 144 drone strikes had been launched. Since then, there have been 222 further drone strikes, in 2011 and 2012 alone. And the numbers are increasing. This suggests that in excess of 350 Afghans have already been killed by UK drone strikes, without any significant public debate or legal analysis.

7.2 The legal analysis above demonstrates how IHL and IHRL place significant constraints on drone use, and impose onerous duties of investigation and reparation. For example, applying the IHL principle of *humanity*, drones may only be used when targets may not be disabled or arrested by other means, even if such alternative means involve a greater risk to UK troops. The UK must also give adequate warning to civilian populations of imminent attack. And applying the principle of *distinction*, particularly an elevated standard in view of the claimed precision of drone strikes, drone attacks that affect civilian populations should not have occurred. Further, IHL also places significant limitations on when civilians are deemed to be directly participating in hostilities. Religious personnel, Taliban supporters and many others deemed to be "Taliban" by the US and UK should not be targeted.

7.3 Human rights obligations, on the other hand, know of no distinction between combatants, civilians and persons participating in hostilities. They impose even greater limitations on when drones may be used. They may prevent their use completely, certainly in the case of "targeted killing". Even attacks during "battle" will only comply with the standard when "absolutely necessary" for the purposes of self-defence. This is a high standard indeed any civilian death is clear evidence of breach.

7.4 The ECHR is capable of application to the UK's use of drones. The convention must apply, and evolve, as modes of warfare evolve, us as the UN Special Rapporteur on Extrajudicial, Arbitrary or Summary Executions deems the ICCPR to apply to US strikes. The Grand Chamber's principled, purposive and fact-sensitive approach to ECHR jurisdiction in *Al-Skeini* strongly supports this conclusion. Human rights accountability and the rule of law require it.

7.5 The over 350 killings by UK drones strongly suggest that the above legal standards have not been observed, particularly in light of the suggestion that only four civilians have been killed. This is to be approached with a high degree of scepticism in light of the other available evidence. Moreover, there is virtually no evidence that the UK is complying with its positive human rights obligations to prevent loss of life, investigate arguable breaches and provide reparation to victims.

7.6 There is therefore a strong presumption that the UK's drones programme is in breach of international law.

7.7 We have also concluded that whilst drones are not illegal *per se* under international law, the use of autonomous armed drones would be. We have also pointed to the transparency deficit regarding the UK's drones programme. Serious questions are raised regarding the rules of engagement that the UK is applying and its analysis of the legal constraints highlighted in this opinion. These concerns are even greater given the UK's close cooperation with the US in the operation of its drones programme and the likely harmonization of rules of engagement across theatre.

7.8 International humanitarian lawyers must interpret the IHL principles proactively to form a bulwark against the prolific use of drones and the advent of autonomous weaponry. IHL should not be a form of self-regulation, in which victims have no voice and the rules are written in consultation with military legal advisers and rarely tested in the courts. It is a body of law that protects civilians and civilian lawyers are entitled to, and must, influence this body of law in a much more proactive way. Purposive interpretations of the IHL principles must be adopted.

7.9 IHRL is a much more stable body of law, being propelled by victims, incorporated into domestic law, tested in the courts regularly and having the benefit of a global jurisprudence.

7.10 Finally, the urgency of this debate must not be diminished by claiming that drones are a mere incremental step, that they are not weapons in themselves, that they are no different to aircraft. This is to bury one's head in the sand. The road to oblivion is paved with incremental changes. Existing law must meet the challenge of this new technology or new law will be required. We suggest that both approaches be pursued in parallel. That will require a concerted effort by lawyers, governments and civil society (including peace and protest movements) alike.

3 June 2013

Written evidence from General Atomics Aeronautical Systems, Inc (GA-ASI) & General Atomics Aeronautical Systems United Kingdom Limited (GA-UK)

SUMMARY

— Established in 1993 and based in California, General Atomics Aeronautical Systems, Inc. (GA-ASI) is a leading designer and manufacturer of Remotely Piloted Air Systems (RPAS)—systems in service with agencies and air arms across the world. GA-ASI's current family of Remotely Piloted Aircraft (RPA), comprising Predator® A, Predator XP, Predator B Reaper, Predator C Avenger® and Gray Eagle®, has accrued over 2.3 million flight hours, 90% under combat conditions. However, these RPA are but one facet, albeit the most easily identified, of a complex, end-to-end system where each element contributes to delivery of a persistent surveillance and potential strike capability.

— Reference to RPA as "drones" has a pejorative connotation that belies their proven beneficial role in humanitarian crises. RPA make a significant contribution not only to safer military operations for ground forces, but also to reducing the cost of natural disasters in both human and materiel terms. Predator B has been used in the US with considerable success to provide relief from floods, forest fires and hurricanes. Such activity underlines the flexibility, utility and importantly the potential of unmanned systems. Their effectiveness derives from a combination of the RPA's ability to remain airborne for periods far beyond the endurance of conventional manned aircraft and also from its suite of on-board equipment, including electro-optical/infrared sensors and multi-function radars (which embody *inter alia* synthetic aperture radar and ground moving target indicator modes), providing a genuine all-weather capability.

— Looking to the future, the UK has the potential to expand further its current Predator B Reaper capability and utility. By introducing various enhancements, including podded systems and extended endurance, the range of missions for both military and civilian applications could be expanded significantly. This would provide opportunities for the UK's world-class aerospace industry to collaborate more closely with GA-ASI and potentially access wider markets, eg through the provision of a flexible maritime surveillance capability and possibly the integration of self-protection measures which could enable operations in less benign environments than hitherto. Operations in more demanding environments might also be facilitated by adoption, in time, of a possible Avenger/Reaper fleet mix.

— Further development of civilian applications will depend to a large extent on certifying RPA to operate in controlled airspace; thus the development of a Type Certifiable Reaper is currently one of GA-ASI's highest priorities. However, the precise specifications to enable RPA to conform to regulatory requirements governing full access to airspace are not yet mature. This pan-European problem is arguably the main area that currently constrains the expansion of RPA use and the full realisation of their undoubted potential.

Introduction

1. General Atomics Aeronautical Systems, Inc. (GA-ASI), in conjunction with General Atomics Aeronautical Systems United Kingdom Ltd (GA-UK), values the opportunity to contribute to the Defence Select Committee's investigation into the UK's current and future use of Remotely Piloted Air Systems (RPAS), announced on 11 July 2013.[281] This paper of written evidence provides detailed background on GA-ASI before addressing the specific issues that, in accordance with the July announcement, the Committee wishes to examine. The opinions herein are those of GA-ASI and GA-UK alone and should not be taken to imply support from any other agency.

Background

2. Based in California, GA-ASI is a leading designer and manufacturer of proven, reliable, long-endurance Remotely Piloted Aircraft (RPA), including Predator® A, Predator B, Gray Eagle®, and Predator C Avenger®. These RPA are equipped with integrated sensor and weapon systems required to deliver persistent surveillance and rapid strike capabilities. To conform to the constraints of the Missile Technology Control Regime, the recently developed and more widely-exportable Predator XP is limited to the provision of surveillance capabilities. Detailed information on the capabilities of these RPA, together with enabling systems, is at Annex A; a glossary of terms is at Annex B.

3. Established in 1993 as an affiliate of General Atomics, GA-ASI also manufactures a variety of Ground Control Stations (GCSs) and provides pilot training and support services for RPA field operations. GA-ASI has produced more than 580 RPA and over 270 GCSs. These RPA have achieved more than 2.3 million flight hours—some 90% in combat operations—and in 2012 alone flew more than 431,000 hours.

4. GA-ASI provides the RAF's current Predator B/Reaper capability; six air vehicles have been delivered thus far together with six mobile GCSs. To date UK industry has not benefitted from this contract primarily because the Reaper capability was procured off-the-shelf as an Urgent Operational Requirement (UOR). However, recognising the world-class capabilities offered by the UK aerospace industry, GA-ASI continues to explore relationships with UK organisations, not least through the office of GA-UK, established in 2010.

5. UK industry has the potential to add value to GA-ASI's products and thereby access a wide market. The highly successful Sovereign Payload Capability Demonstration (SPCD), a private venture in conjunction with Selex Galileo (now Selex ES) in the US in May 2012, is tangible evidence of this approach. It demonstrated the feasibility of integrating a UK system, the Seaspray 7500E multi-mode radar, onto a Predator B platform, paving the way for Reaper customers world-wide to develop a route to an independent operational capability. More recently GA-ASI began working with MBDA on the integration of Dual Mode Brimstone onto a Predator B under the umbrella of the US Air Force (USAF) Big Safari organisation. Again this involves private venture money or, in US terminology, IRAD (Internal Research and Development) funding.

6. GA-ASI also recognises the strength of the UK's service support sector and has a close relationship with Cobham Aviation Services. GA-ASI's aspiration is eventually to sub-contract support through Cobham not only for UK operations at RAF Waddington but also on a wider, opportunity basis.

Nomenclature and Definitions

7. GA-ASI has spent more than 20 years developing RPAS, sometimes referred to as UAS[282] (Unmanned Air Systems), and accepts that customers will use terminology appropriate to their own national or agency environment. Implicit in the "systems" terminology is the concept of a complex, end-to-end operation within which the RPA, a specific embodiment of a UAV (Unmanned Air Vehicle), is but one element, albeit the most

[281] Defence Committee email 11 July 13: Defence Committee, Select Committee Announcement.

[282] The US Federal Aviation Authority describes a UAS as "the unmanned aircraft [ ] and all of the associated support equipment, control station, data links, telemetry, communications and navigation equipment, etc, necessary to operate the unmanned aircraft". An RPAS is but one manifestation of a UAS.

obviously identifiable. For the purposes of this paper RPA and UAV can be considered as one and the same (as indeed can RPAS and UAS), albeit hereinafter the terms RPA and RPAS are used almost exclusively. It is relevant here that RPA are referred to colloquially by the press and the general public as "drones", terminology that has acquired pejorative connotations and doubtless contributes to the RAF preferring the less emotive RPA/RPAS terminology.

8. A large and sophisticated RPAS such as the Reaper system comprises a number of interdependent elements, each of which contributes towards overall system effectiveness. The air vehicle itself is controlled via a GCS using a two-way data link and is equipped with a variety of on-board mission systems appropriate to its role, eg ISTAR[283] or the application of firepower. System functionality is enabled by terrestrial (line-of-sight) and satellite (beyond line-of-sight) communications. The successful integration of all these various aspects is critical to mission accomplishment; but no matter how sophisticated and potentially effective the system, realising its full potential remains a human function.

9. Automation and autonomy can contribute much to RPAS operations. Automation can be thought of as following a set of prescribed rules while autonomy describes various levels of self-determination through bounded on-board decision-making. In relatively simple manifestations, eg automatic take-off and landing, automation reduces pilot workload and hence the chance of human error. Increased sophistication in terms of autonomy could, in time, enable more complex and demanding missions, including anti-access/area denial (A2/AD) and automatic target recognition and prosecution. However, for the period to 2020 covered by this Inquiry, the requirement for direct human control is likely to remain.

Current RPAS Utility and Dispersal

10. The latest Predator series RPA offer significant payload capacity embodying a "plug-and-play" approach. Together with modular systems architecture, this maximises operational versatility and hence provides the capability to support an expanding array of military and civil missions. In the military environment RPA increase situational awareness for commanders and ground troops, thereby contributing to safer military operations, not least by effectively mitigating threats, and execute the "dull, dirty and dangerous" missions without putting aircrew at risk. Moreover, by virtue of their inherent flexibility, RPAS can be, and are, used increasingly in a variety of civilian roles. While military and civilian applications are discussed below, comments on combat operations—more properly the province of RPAS operators—are restricted largely to generalisations.

11. **Combat Operations.** Predator series RPAS have operated in combat theatres since the Bosnia conflict in the mid-1990s. The US Department of Defense (DoD) directive to increase Intelligence, Surveillance and Reconnaissance (ISR) patrols (or "orbits"[284]) in the Afghanistan theatre from over 40 to 65 subsequently underlined the continuing utility of the USAF RPAS inventory. The RPA's ability to remain airborne for nearly 40 hours without refuelling provides the persistent ISR essential to the collection of extensive data on adversary activities. For the soldier on the ground RPA can transmit images directly to a portable device and also provide a time-sensitive strike capability to counter fleeting threats. Additional applications include convoy protection, where the use of ISR sensors to identify IEDs (Improvised Explosive Devices) is invaluable.

12. **Border Patrol.** Since 2005 the US Department of Homeland Security (DHS) has operated a growing number of Predator Bs. During 2011 this fleet contributed to the capture of some 7,600 lb of illegal drugs and the apprehension of 467 individuals participating in illegal activities.

13. **Maritime Surveillance.** To safeguard US maritime approaches and patrol drug transit zones, DHS operates Guardian, a Predator B optimised for long-range maritime surveillance. Boosting the US's overall maritime domain awareness, these RPA include enhancements to avionics, communications and sensor capabilities.

14. **Humanitarian Assistance/Disaster Relief.** The use of RPAS in a wide range of humanitarian and disaster relief roles is less well understood than the military and agency activities outlined above. The remainder of this section therefore goes into some detail in describing these civilian roles.

15. **Hurricane Relief.** In September 2008 DHS deployed a Predator B to support disaster recovery and first responder efforts for Hurricane Gustav—a new innovation in terms of disaster response. Patrolling over Louisiana, it provided real time video of damaged oil terminals, levees, roads and bridges as well as real time Electro-Optical/Infrared (EO/IR) sensor imagery and Lynx multi-mode radar imagery of coastal damage. Identifying these post-event trouble spots provided real time situational awareness to first responders, allowing them to prioritise employment of government resources. The effectiveness of this massive response effort, involving well over 1,200 personnel—federal, state and local officials as well as response teams—was enhanced by widely disseminated Predator B video, provided by secure internet feed. That same year a DHS Predator B also supported Hurricane Hanna relief efforts, flying a 12-hour mission over Florida, Georgia, South Carolina, and North Carolina to baseline critical infrastructure before, and assess damage after, the hurricane's landfall.

16. **Flood Relief.** In April 2009 DHS diverted a Predator B from its border patrol mission to North Dakota's Red River Valley to monitor and assess heavy flooding and severe storm damage. This activity (nearly 100

[283] Intelligence, Surveillance, Target Acquisition and Reconnaissance.
[284] An orbit (or "task line" in RAF terms) denotes a continuous, ie, 24/7, surveillance/strike presence.

hours over 11 missions) marked the first US employment of an RPA to help mitigate the effects of large-scale flooding. Predator B's EO/IR and Lynx radar systems provided data vital for planning and executing North Dakota's flood response efforts, pinpointing ice floes and providing time-lapse imagery that tracked flood patterns, the speed of floodwaters, and anticipated danger to levees, bridges, people and property. This imagery proved pivotal for coordinating the rapid and effective humanitarian actions of local, state and federal response groups. Subsequently, during the 2011 Red River flood response, DHS collected 1,778 nautical miles of Predator B Lynx Synthetic Aperture Radar (SAR) imagery in 22 days, marking the single most extensive SAR collection effort ever achieved by the agency. Lynx imagery provided wide-area, high-resolution maps which, as in North Dakota, proved key to the effectiveness of response groups.

17. **Firefighting Relief.** NASA's Predator B (Ikhana) is equipped with a specialised infrared pod that maps and displays the movement of a fire's hotspots, providing real time data to firefighters on the ground. Ikhana was used extensively to aid local firefighters in defending against a wildfire that devastated Southern California in 2007 and supported firefighters again in 2011 during the largest wildfire in Arizona state history. In addition, DHS's Predator B provided streaming video and Lynx SAR mapping of areas affected by the fires to the US Geological Survey, Bureau of Land Management, the US Forest Service and other agencies. Lynx imagery, which remained unaffected by smoke or cloud cover, helped firefighters coordinate resources to monitor, predict and effectively control the blaze. Most recently, and in the same vein, Predators from the California National Guard contributed significantly to efforts to contain a major wildfire (one of California's largest on record) that began in mid-August 2013, threatening Yosemite National Park.

18. **Earthquake Relief.** In 2012 a USAF Reaper helped with mock search and rescue efforts after a simulated earthquake struck southern California, demonstrating the aircraft's ability to integrate with civilian disaster relief agency efforts. This exercise followed in the wake of a powerful earthquake that shook Haiti in 2010, where USAF RPA were critical in helping first responders locate fires and find survivors.

Lessons Learned from Operations in Afghanistan

19. The RAF is best placed to comment on lessons learned from UK operations in Afghanistan.

Tomorrow's Potential—Additional UK Capabilities

20. In considering what capabilities the UK should seek to develop to 2020, this section identifies possibilities for building on the capabilities offered by its current Reaper RPAS and reinforces the mutual benefits that could derive from closer US/UK industrial collaboration.

21. **Certification and Airspace Integration for Wider Employment.** The RAF's Reaper fleet was procured solely for use in the Afghanistan theatre. To exploit its potential to the full in the post-Afghanistan era would require unfettered access to non-segregated airspace. This requires type certification, together with the ability to comply with regulations that are still evolving. GA-ASI is focused on securing Reaper type certification in compliance with UK/NATO/European standards to enable flight in non-segregated UK airspace and has initiated an IRAD programme to develop a Predator B variant, fully compliant with the type certification requirements of the UK, USA and anticipated NATO customers. GA-ASI is already working with MoD, Cobham and others to ensure compliance with UK Defence Standards (DEFSTANs) and NATO Standardisation Agreements (STANAGs). A sense and avoid (SAA)[285] capability—one capable of interoperating with other airspace users, detecting airborne vehicles not equipped with transponders and facilitating collision avoidance—is an essential prerequisite here. GA-ASI is therefore developing a proof-of-concept SAA system under IRAD funding. Flight tests with a prototype Due Regard Radar (DRR) are already underway and, in related developments last year, GA-ASI successfully demonstrated an Automatic Dependent Surveillance-Broadcast (ADS-B)-based surveillance system aboard a DHS Predator B. Both ADS-B and DRR are central to the maturation of Predator B's SAA architecture.

22. **Maritime Surveillance.** Building on the 2012 SPCD (cf para 5 above), the UK could equip Reaper with the Selex ES Seaspray 7500E multi-mode radar to provide an effective maritime surveillance system with potential further to expand the capability through additional podded systems. Such a solution would also confer greater operational flexibility since the Seaspray radar can be fitted/removed in a matter of hours. It is relevant to this potential enhancement, and indeed to other roles, that GA-ASI is developing field-retrofittable wings with internal fuel tanks that extend Predator B endurance by some 56%, to 42 hours.

23. **Anti-Access/Area Denial (A2/AD).** UK experience of combat operations with large RPA is limited to Afghanistan's relatively benign environment, but future combat zones may prove more demanding. Pending development of an indigenous stealthy UCAV (Unmanned Combat Air Vehicle) capability, there may be benefit in the UK considering an interim solution to RPAS operations in more demanding scenarios. Predator C Avenger offers considerable advantages in this respect. It utilises the same infrastructure as Reaper (a common GCS and communications system) and shares many of the same on-board systems. This means Avenger is not significantly more costly than Reaper, suggesting that a fleet mix could be an affordable option. Importantly, Avenger also offers the potential to leverage UK aerospace industry expertise and gain operational experience to inform the UK's stealthy UCAV programme. It could be fitted with UK systems/sensors and its stealth characteristics could be enhanced by UK signature reduction technologies. As with Reaper, but to a significantly

[285] SAA is also referred to as Detect and Avoid (DAA).

greater degree, Avenger's potential for operations in non-benign environments could be augmented by integrating self-protection enhancements, eg those at paras 24d, 24e and 24f below.

24. **Podded Capability Expansion Possibilities.** Potential exists to expand progressively the RAF's Reaper capability through the integration of role-specific external pods—an area that offers significant opportunities for UK industry. Future "add-on" capabilities could possibly include:

(a) Chemical and biological detection.

(b) Search and rescue, including deployment of raft and life-saving equipment.

(c) Enhanced Electronic Support Measures (ESM).[286]

(d) Radar jamming.[287]

(e) Specific self-protection elements.

(f) Stand-off miniature air-launched decoys.

(g) Submarine detection and tracking.

(h) Strategic/long-range electro-optical camera (UTC/Goodrich DB-110).

Constraints on RPAS use

25. The primary constraint on RPAS use is lack of access to non-segregated airspace. In light of GA-ASI's privately funded initiative to develop a Type Certifiable Predator B and an SAA system, this section provides an overview of current airspace access procedures for Predator B in the US and comments on the UK and European positions in this respect.

26. **Access to US National Airspace (NAS).** In the US, Certificates of Authorisation (COAs) are required for RPA to fly in NAS and are issued to public-use agencies[288] authorising use of defined airspace for a specified time with ATC providing positive separation or, pending the certification of an SAA system, a "chase" aircraft. DHS and the US military operate in NAS in compliance with FAA regulations using the COA process. DHS works with the FAA to define the RPA's flight path, with the FAA then securing the necessary airspace and subsequently issuing COAs as required. Federal agencies plan to increase future use of RPA and to accomplish this, the President and Congress directed the FAA in 2012 to develop a plan for the safe integration of civil RPA into NAS no later than September 2015.

27. **Access to UK and European Airspace.** Whilst the US has adopted a pragmatic approach to opening up NAS for RPAS use, there seems to be a more confusing picture in Europe. In the US, the FAA is the sole organisation responsible for setting the regulations for, and providing services in, civilian airspace, whereas in Europe numerous agencies and organisations can legitimately claim to have a stake, including EASA,[289] EUROCONTROL,[290] national CAAs (Civil Aviation Authorities) and ANSPs.[291] Until regulations governing operations are clarified and ideally coordinated across the UK and Europe, it will prove difficult for RPAS to realise their full potential. The European RPAS roadmap[292] is a first step in this respect.

Ethical and Legal Issues

28. GA-ASI does not feel it appropriate to comment on ethical and legal issues; it is more properly a matter for RPAS operators, in this case the MoD/RAF.

Recommendations

29. It is recommended that consideration be given to:

(a) Providing RAF Reapers with a maritime capability by incorporating the SeaSpray 7500E multi-mode radar.

(b) Investigating the benefits and cost effectiveness of developing an RAF Avenger/Reaper force mix.

(c) Clarifying, simplifying and accelerating the development of a regulatory framework to facilitate RPAS access to non-segregated airspace.

[286] ESM generally consist of two elements: electronic intelligence and communications intelligence. The former is often allied to an ECM (electronic countermeasures) system.

[287] This Electronic Warfare capability was successfully demonstrated in April 2013.

[288] DoD, DHS, NASA etc.

[289] European Aviation Safety Organisation.

[290] European Organisation for the Safety of Air Navigation.

[291] Air Navigation Service Providers.

[292] Roadmap for the Integration of Civil Remotely-Piloted Aircraft Systems into the European Aviation System, Final Report from the European RPAS Steering Group, June 2013.

Annex A

DETAILED DESCRIPTIONS OF INDIVIDUAL RPAS COMPONENT CAPABILITIES

A1. Over the past two decades GA-ASI has developed a series of innovative and versatile long-endurance RPAS. Current systems embody a suite of sensors including Electro-Optical/Infrared (EO/IR) cameras and the Lynx multi-mode radar. Equipped with laser illumination/designation capabilities, the EO/IR cameras stream high-definition colour and infrared video via a communications data link simultaneously to both the GCS and ground forces. These capabilities underwrite the current use and deployment of the GA-ASI systems described below.

A2. **Predator.** Predator (referred to as Predator A to distinguish it from its immediate successor, Predator B) is the most combat-proven RPA in the world, capable of a variety of combat missions, including Intelligence, Surveillance and Reconnaissance (ISR), targeting, forward air control, laser designation, precision strike and bomb damage assessment. First flown in 1994, Predator has accumulated almost 1.4 million flight hours, over 90% in combat operations. It was the first RPA to be weaponised and has the highest mission capable rate of any aircraft in the US Air Force (USAF) inventory. It is a testament to the air vehicle's reliability and durability that USAF Predator #107 has exceeded over 20,000 flight hours[293] to date. Predator is also operational with the US Navy and the Italian Air Force. Details of Predator A capabilities are outlined in Table 1 below:

Table 1

PREDATOR A SPECIFICATIONS

Maximum Gross Take-off Weight	1043 kg (2,300 lb)
Wing Span	17m (55 ft)
Maximum Endurance	40 hr
Maximum Altitude	7620m (25,000 ft)
Maximum Air Speed	120 KTAS
Payload Capacity (Internal)	204 kg (450 lb)
Payload Capacity (External)	136 kg (300 lb)
Number Produced (to date)	279+

A3. **Predator XP.** Predator XP is a recently developed and improved variant of the Predator with the United Arab Emirates (UAE) as its first customer. Predator XP's characteristics and performance specifications closely mirror those of Predator A. However, the driving factor in its design was strict compliance with the Missile Technology Control Regime; it provides neither external payload capacity nor weapons capability, thereby enabling its export to a wider international market than other GA-ASI RPAS.

A4. **Predator B (aka MQ-9 Reaper and Guardian).** A mature system, Predator B has surpassed 600,000 flight hours. Developed using company funding as the successor to the original Predator, Predator B is almost five times the maximum gross takeoff weight of Predator A and incorporates *inter alia* advanced EO/IR, Lynx multi-mode radar, Electronic Support Measures (ESM), signals intelligence and multiple weapon options. Predator B is engineered to exceed manned aircraft reliability standards and, as with all GA-ASI's currently manufactured RPA, is equipped with triple redundant avionics and dual redundant flight control surfaces. It can be equipped with a multi-mode maritime radar for long-range maritime surveillance in the Guardian configuration or as a role fit for Reaper. Predator B's payload can be spread across seven external stations. The USAF's Predator B has a mission capable rate exceeding 90%, second only to Predator. Predator B series aircraft have been acquired by the RAF, USAF, US Navy, US Department of Homeland Security (DHS), NASA and the Italian Air Force. The French Air Force has also recently announced plans to procure Predator B. The Guardian configuration includes *inter alia* the addition of additional VHF radios, a podded 360° multi-mode maritime surface search radar, and an automatic identification system (AIS).[294]

Table 2

PREDATOR B SPECIFICATIONS

Maximum Gross Takeoff Weight	4763 kg (10,500 lb)
Wing Span	20m (66 ft)
Maximum Endurance	30 hr
Maximum Altitude	15240m (50,000 ft)
Maximum Air Speed	240 KTAS
Payload Capacity (Internal)	363 kg (800 lb)
Payload Capacity (External)	1678 kg (3,700 lb)
Number Produced (to date)	145+

A5. **Gray Eagle.** Gray Eagle is an advanced derivative of the combat-proven Predator. Operational with the US Army, it provides a reliable, affordable, low-risk, next-generation tactical RPA solution for persistent Reconnaissance, Surveillance and Target Acquisition (RSTA) as well as strike operations. Controlled directly

[293] By way of comparison, the F-22 Raptor was designed for a service life of 8,000 flight hours.
[294] A transponder-based system for tracking cooperative vessels. Need to delete space between footnotes

by Army field commanders, and equipped with a proven Automatic Take-off and Landing System (ATLS),[295] Gray Eagle's dedicated mission set includes wide-area ISR, convoy protection, Improvised Explosive Device (IED) detection and defeat, close air support, communications relay and weapons delivery missions. Flight testing of Improved Gray Eagle (IGE) has already begun. IGE will provide a 50% increase in internal fuel together with a centreline hardpoint capable of carrying either a 500lb fuel tank or an additional sensor.

Table 3

GRAY EAGLE SPECIFICATION

Maximum Gross Takeoff Weight	1633 kg (3,600 lb)
Wing Span	17m (56 ft)
Maximum Endurance	30 hr
Maximum Altitude	8839m (29,000 ft)
Maximum Air Speed	150 KTAS
Payload Capacity (Internal)	204 kg (425 lb)
Payload Capacity (External)	522 kg (1,150 lb)
Number Produced (to date)	83+
Flight Hours (to date)	116,000

A6. **Predator C Avenger.** Developed as an internally-funded programme, the jet-powered Predator C Avenger combines reduced radar signature, increased speed and long-endurance for wide-area surveillance and time-sensitive, precision strike missions. It has an internal weapons bay and retractable EO/IR sensor and boasts triple redundant avionics and dual redundant flight control surfaces. Importantly, it can be controlled from the same GCS as both Predator and Reaper and shares a significant number of avionics systems with Predator B.

Table 4

PREDATOR C AVENGER SPECIFICATIONS

Maximum Gross Takeoff Weight	7167 kg (15,800lb)
Wing Span	20.11m (66 ft)
Maximum Endurance	18 hr
Maximum Altitude	15240m (50,000 ft)
Maximum Air Speed	400 KTAS (Standard Dash 350 KTAS)
Payload Capacity (Internal)	1588 kg (3,500 lb)
Payload Capacity (External)	1361 kg (3,000 lb)

A7. **Sea Avenger.** Remotely operated, Sea Avenger is under development and has been designed for aircraft carrier operations in order to provide the US Navy with organic, long-endurance ISR and time-sensitive strike capabilities. The design, which has evolved from the land-based Predator C Avenger, includes a highly fuel-efficient engine, retractable EO/IR sensor, internal payload space for auxiliary fuel, retractable air refuelling probe, folding wings and deck tie-downs. Sea Avenger's structure is strengthened for catapult launch and arrestor cable landing operations, and is equipped with reinforced landing gear, spoilers and a tail hook. Operationally proven Predator-series mission systems are transferrable to Sea Avenger and can accelerate its readiness for carrier deployment. Such systems include a federated sensor suite, redundant avionics, voice/data communications, automatic take-off and landing and a mature stores management system.

A8. **Ground Control Stations (GCSs).** Over the past twenty years, GA-ASI has produced more than 270 GCSs. Featuring high mobility and portability, these stations allow direct, real time control of Predator/Gray Eagle-series RPA and may be located on land, aircraft or ship. The GCSs enable control of RPA sensors and payloads, while also supporting analysis and dissemination of collected ISR data. GA-ASI's next-generation Advanced Cockpit GCS provides additional features designed to enhance situational awareness and improve GCS operator efficiency.

A9. **Lynx Multi-mode Radar.** The Lynx multi-mode radar is a state-of-the-art, lightweight, high-performance, multi-function radar that operates in Synthetic Aperture Radar (SAR) and Ground Moving Target Indicator (GMTI) modes on RPA and manned aircraft throughout the world. The all-weather Lynx provides photographic quality images through clouds, rain, dust, smoke and fog, in daylight or total darkness, for detecting time-sensitive targets and changes on the ground that may be undetectable by EO/IR sensors. Lynx's long-range and wide-area surveillance capabilities include high-resolution SAR imagery at slant ranges beyond effective EO/IR ranges. Additionally, its broad-area GMTI scanning capability detects and tracks moving targets in real time for cuing EO/IR sensors. GA-ASI has produced some 340 Lynx radars thus far.

[295] ATLS has completed over 10,000 successful automatic take-offs and landings and is the precursor of the Automatic Take-off and Landing Capability (ATLC) currently being developed for Reaper.

Annex B

GLOSSARY OF TERMS

A2/AD—Anti-access/Area Denial

ADS-B—Automatic Dependent Surveillance-Broadcast

AIS—Automatic Identification System

ANSP—Air Navigation Service Provider

ARC—Advisory and Rulemaking Committee

ATC—Air Traffic Control

ATLC—Automatic Take-off and landing Capability

ATLS—Automatic Take-off and Landing System

CAA—Civilian Airspace Authority

COA—Certificate of Authorisation

DAA—Detect and Avoid

DEFSTAN—Defence Standard

DHS—Department of Homeland Security,

DRR—Due Regard Radar

EASA—European Aviation Safety Organisation

ECM—Electronic Countermeasure

EO/IR—Electro-Optical/Infrared

ESM—Electronic Support Measures

EUROCONTROL—European Organisation for the Safety of Air Navigation

FAA—Federal Aviation Authority

GA-ASI—General Atomics Aeronautical Systems, Inc

GA-UK—General Atomics Aeronautical Systems United Kingdom Limited

GCS—Ground Control Station

GMTI—Ground Moving Target Indicator

IED—Improvised Explosive Device

IGE—Improved Gray Eagle

IRAD—Internal Research and Development

ISR—Intelligence, Surveillance and Reconnaissance

ISTAR—Intelligence, Surveillance, Target Acquisition and Reconnaissance

MoD—Ministry of Defence

NASA—National Aeronautics and Space Administration

NATO—North Atlantic Treaty Organisation

RAF—Royal Air Force

RPA—Remotely Piloted Aircraft

RPAS—Remotely Piloted Air (or Aircraft) Systems

RSTA—Reconnaissance, Surveillance and Target Acquisition

SAA—Sense and Avoid

SAR—Synthetic Aperture Radar

SPCD—Sovereign Payload Capability Demonstration

STANAG—Standardisation Agreement

UAE—United Arab Emirates

UAS—Unmanned Air (or Aircraft) Systems

UAV—Unmanned Air Vehicle

UCAV—Unmanned Combat Air Vehicle

UK—United Kingdom

UOR—Urgent Operational Requirement

US—United States

USAF—United States Air Force

VHF—Very High Frequency

Written evidence from Stefan Wolff, Professor of International Security, University of Birmingham

SUMMARY

The increasing deployment of so-called drones (Unmanned Aerial Vehicles [UAVs], or Remotely Piloted Aerial Vehicles [RPAVs])[296] over the past decade in the context of the US-led global counter-terrorist campaign for the purposes of surveillance, monitoring, intelligence gathering, and military strikes has given rise to a growing debate on the legality, legitimacy, and strategic effectiveness of this approach. However, the latter has received less attention than the other two dimensions, and debate in the UK on the effectiveness question is less informed, especially as it relates to the doctrinal and regulatory implications of the use and proliferation of military drone technology.

This background paper offers a summary of the current debate on remote warfare. In so doing it draws on a range of different sources, including publically available government documents, analysis provided by think tanks, academic publications, and information gathered in the course of a number of interviews and focus groups conducted in London, Washington and Brussels.[297] The paper focuses on the policy aspects of the drones debate, not on its legal dimension and elaborates on four specific dimensions:

(1) the objectives for which drones are used in the context of counter-terrorism;

(2) the positive and negative effects of the use of drones beyond counter-terrorism;

(3) the effectiveness of the drones campaign to date from a counter-terrorist perspective; and

(4) the effectiveness of the drones campaign from a broader national and international security perspective

In concluding, the paper outlines some key considerations for shaping future UK drones policy.

THE CURRENT DEBATE ON REMOTE WARFARE[298]

The objectives of drone warfare

1. The primary objectives of drones in pursuit of counter-terrorist objectives are intelligence, surveillance and reconnaissance (ISR), the disruption of terrorist networks (including denial of safe havens and training grounds, and the elimination of suspected terrorist leaders and operatives. In other words, the use of drones for targeted killing is but one of a range of purposes for which they can be employed, and drones are only one tool employed for targeted killings. In the cases of Afghanistan,[299] Pakistan,[300] and Yemen,[301] the public debate on their use is particularly linked to the elimination of terrorist operatives considered actual and potential threats to US and other Western security interests. Less, if any, attention is focussed on the deployment of drones for ISR purposes.[302]

2. The specific capabilities that drones have—greater speed of deployability against ISR or strike targets, enhanced precision of targeting, spatially and temporally extended reach into otherwise inaccessible areas, and limiting danger to pilots—make their use often preferable compared to the deployment of troops or special

[296] The term predominantly used in the media, in academic accounts, and in some of the policy literature is drones. I will also use this term, without implying any pejorative meaning.

[297] Given the sensitivity of the subject matter, these discussions took place on the condition of anonymity and insights gleaned from them are not specifically referenced below.

[298] Good overviews of the debate are, among others, Bachmann (2013), Boyle (2012), Boyle (2013), Dworkin (2013), and Galliott (2012). See also, Aaronson and Johnson (2013).

[299] See for example, Geiß and Siegrist (2011), Gilli and Gilli (2013), Miller (2011), O'Hanlon and Riedel (2010), Wilner (2010), and Zenko (2013).

[300] See for example, Zaidi (2009), Ahmad (2010), Aslam (2012), Bachmann (2013), Davies (2009), Plaw (2013), and (Williams (2010), 2013)). More generally on the complexity of the situation in Pakistan, see Ahmad (2010) and Synnott (2009).

[301] See for example, Hudson, Owens, and Callen (2012), Hull (2011), Lin (2010), Sohlman (2011), and Zenko (2012). More generally on terrorist threats in Yemen, see Phillips (2011).

[302] Almost 10 years ago, Cogan (2004) argued that intelligence officials in the 21st century would be hunters, rather than gatherers. While linking this primarily to the increased use of special forces operations, the analogy applies just as much, and arguably even more so, to the advanced ISR capabilities that contemporary drones possess.

forces on the ground. These secondary objectives of drone use, based on their relative advantage over other means, however, do not come without specific drawbacks.

3. To begin with, in the context of targeted killings, drone strikes are less flexible in outcome than special operations (where soldiers on the ground can decide whether to kill or to capture), they thus result in a loss of intelligence that could have been gathered from a captured terrorist operative or that could have been gained from continuing to monitor the movements of an alive terrorist operative.

4. Using drones, rather than troops or Special Forces on the ground, is also meant to achieve a greater degree of precision in strikes in order to limit "collateral damage" and civilian casualties in pursuit of the same counter-terrorist objectives.[303] While there is clear evidence that the deployment of drones has become significantly more "precise",[304] legitimating their use on these grounds runs the danger of creating unrealistic, self-defeating expectations that can easily backfire when civilians are injured or die in drone strikes.

5. Moreover, even if drones were to avoid any civilian casualties and minimise material destruction, their deployment still involves a violation of sovereignty if it occurs without the consent of the government of the state over whose territory they are operated. Yet, the purpose of using drones, rather than troops or Special Forces on the ground, would be to minimise such violations of sovereignty.

The positive and negative effects of drones beyond counter-terrorism

6. Following on from the discussion of the rationales behind the use of drones for counter-terrorist objectives, among the positive effects are improved intelligence, surveillance and reconnaissance (ISR) aiding in the discovery and prevention of terrorist plots, the elimination of high-value targets (or their capture by Special Forces Operations based on drone ISR), and the denial of safe areas and training facilities for terrorist leaders and operatives.

7. On the negative side, the most frequently cited unintended effect that can occur instead of, or alongside, possible benefits of using drones in counter-terrorist campaigns, is the enlargement of the pool of potential recruits to terrorist groups as a result of broader resentment among the public.[305]

8. This latter point is also highly relevant in terms of possible negative effects from the use of drones from the perspective of counter-insurgency, because drones have been, and are, deployed in contexts of a simultaneous insurgency in all countries in which they are currently being used for counter-terrorist purposes. In Afghanistan, the United States has been active in a counter-insurgency campaign against the Taliban as a direct party to this conflict, whereas in Pakistan and Yemen (as well as in Somalia and across the Sahel zone[306]), the US is not officially a party to conflicts between the respective governments and various insurgent forces. In other words, the application of drone strikes does not merely have effects in relation to a counter-terrorism strategy, but it also affects counter-insurgency campaigns, whether pursued directly by the US or by states' governments, or by a combination of both.

9. Negative effects for counter-insurgency result primarily from the loss of civilian lives as both insurgent (and terrorist) narratives are essentially validated. The likely result of this is a strengthening of support for the insurgent movements and increased hostilities inflicting higher costs on the United States, where it is directly involved in counter-insurgency campaigns, local governments, as well as civilian populations that are not only exposed to greater threats to their physical lives but also overwhelmingly bear the social, economic and political costs of insurgent wars.

10. In this respect, it is also important to be mindful of the danger that insurgent movements and terrorist organizations (or their local branches or affiliates) increasingly perceive a "common enemy" and join forces: insurgents provide safe havens and local knowledge to terrorists, terrorists provide increased expertise, reach and possibly funds to local insurgencies. Such links are further likely to be mutually reinforcing where insurgents and terrorists can benefit from links with organized crime, profiteering from drugs, weapons and illegal migrants. All these different dynamics clearly play out, albeit to different degrees, in Afghanistan, Pakistan and Yemen.

11. That said, there are possible positive effects of the use of drones in counter-insurgency situations as well. Drones deployed for ISR for counter-terrorist purposes can assist in increasing the effectiveness of counter-insurgency campaigns, for example, by enabling the disruption of insurgent movements and supply lines. Targeted strikes against terrorist groups can have a deterrent effect, at least in the sense that terrorist-insurgent alliances become less likely, partly because terrorists are seen as bringing drones with them and increasing

[303] For these and other arguments favouring the use of drones in conflict theatres like Afghanistan, Pakistan and Yemen, and primarily for counter-terrorist objectives, see, among others, Byman (2013), Panetta (2009), Schmitt (2010), Williams (2013), and Wilner (2010). For a moral justification of employing drones, see Strawser (2010).

[304] In relation to Pakistan, for example, precision, as measured in the number of civilians killed, has increased significantly. According to data by the available from The Bureau of Investigative Journalism (2013), the number of estimated civilian casualties has decreased in absolute numbers since 2009, as well as relative compared to the number of terrorist suspects killed: from a high of 100 civilians killed by drone strikes in 2009, down to 84 (2010), 52 (2011), 4 (2012) and in the first seven months of 2013.

[305] This so-called "blowback" has been widely cited as major drawback in terms of the long-term effectiveness of drone warfare. Cf. Boyle (2013), Cronin (2013), Gilli and Gilli (2013), Hudson, Owens, and Flannes (2011), Hudson, Owens, and Callen (2012), and Satia (2009).

[306] On the extension of the drone campaign to the Sahel zone, see Schmitt (2013).

risks to insurgents by making them accidental or deliberate targets of drone deployment for both ISR and targeted/signature strikes. Thus, an effective counter-terrorist campaign can deny insurgents access to resources, safe havens and expertise and thus increase the likelihood of political settlement as it potentially limits their ability to mount a victorious military campaign against the government.

12. The use of drones thus can affect intra-state conflicts towards escalation or de-escalation (as well as maintain a status quo). However, drone use also has an effect on the relations between states, eg, between the US and the governments of Afghanistan, Pakistan, or Yemen. As these governments come under increasing pressure domestically because of the impact of drone strikes, they are likely to become more hostile, at least rhetorically, vis-à-vis the US, thus potentially further validating terrorist and insurgent narratives. If hostility extends beyond mere rhetoric, the US may well face losing their cooperation or at least seeing it reduced or suspended. Potentially, similar blow-back could be experienced in countries, and from populations, where the US stations drones. This would reduce the ease with which they can currently be deployed or require sea-based alternatives to current land-based stationing.[307]

13. In order to assess the broad policy implications of drone strikes, we thus need to consider their combined effects in terms of counter-terrorism and counter-insurgency as it is these combined effects that produce a net-effect (increase, decrease, or status quo) for national and international security through the impact that they have on intra-state and inter-state conflicts (see Figure 1). However, without careful and systematic analysis, of which there is relatively little available to date, partly because of the limited availability of suitable open-source data, we can merely observe a net-impact of a range of factors on national and international security; with drones being one among these factors. In this sense, Figure 1 is a simplification for illustrative purposes, not a statement of a definitive causal chain.

The effectiveness of the drones campaign to date: the counter-terrorist context

14. Targeted killings of leaders of non-state terrorist groups have a long and mixed history of success. They are meant to reduce capabilities, demoralize rank and file members, and deter new recruits.[308] While drones are not the only way to conduct a campaign of targeted killings, they have arguably been effective in eliminating a number of high-value terrorist operatives (as well as mid-level cadres and foot soldiers) in Afghanistan, Pakistan, and Yemen—that is, they have been instrumental in achieving key objectives in a counter-terrorism strategy (Schmitt 2010).

15. Because of their superior ISR capabilities, deploying drones for targeted and/or signature strikes[309] has also limited training capacities, especially in Pakistan, for foreign fighters by reducing the number of trainers available and limiting access to and mobility in training camps. Limited access to training has had a negative effect on the international reach of al-Qaeda and its affiliates: it has reduced the effectiveness of jihadist fighters in a technical sense (eg, bomb-making expertise) and in an operational sense (eg, their ability to operate covertly in the societies they target).

16. In Yemen, with al-Qaeda in the Arabian Peninsula (AQAP) being the dominant group, the killing of top-level leaders has reduced the number of foreigners going to the country for training. Pakistan, in contrast, because of the larger number of jihadist groups has not seen a similar drop in foreign recruits.

17. However, this relative success has come at a price. Public opinion surveys and local and international media coverage, as well as academic research and reports by advocacy organizations indicate that blowback has been significant.[310] Anti-Americanism is on the rise (Zaidi 2009), often explicitly linked to the use of drones, insurgent violence continues unabated in Afghanistan[311] (targeting the US and ISAF presence as well as Afghan security forces) and Pakistan (putting increasing pressure on an already weak government), and both the governments of Afghanistan and Pakistan have increased their public stance against the US and especially its drones policy. In Pakistan, in particular, this has apparently necessitated a change in US policy away from so-called signature strikes (Brown 2013, Gannon and Abbot 2013, Markey 2013).[312]

18. The available evidence, thus, suggests that the use of drones has eliminated individuals but not destroyed the networks in which they operate, nor has it created a significant more hostile local environment for terrorist

[307] Independent of any potential need for sea-based drones bases, there is potentially also a separate incentive to develop sea-based alternatives in that carriers could be smaller and cheaper to procure and operate, thus increasing their number overall and with it UK opportunities to project power and influence (Shields and Spencer 2011).

[308] For a recent overview of targeted killings as a form of warfare, see Bachmann (2013) and, slightly more dated, Patterson and Casale (2005). See also Dworkin (2013) and Kretzmer (2005). Note also that drone strikes can be a useful tool within a broader arsenal of deterrence against terrorist networks as argued by Kroenig and Pavel (2012). David (2003) examines arguments in favour of Israel's policy of targeted killing.

[309] Targeted (or personality) strikes are those that are meant to eliminate so-called high-value targets, whereas signature strikes are those that are carried out on the basis of observable patterns of activity likely linked to terrorist behavior. In both cases, targeting poses significant legal challenges, including the need to comply with principles of distinction, discrimination, and proportionality (Boothby 2012). On targeting more broadly, see Callahan *et al* (2012), Gray (2013), and Hardy and Lushenko (2012). Specifically on targeting in so-called signature strikes, see Heller (2013).

[310] See, for example, Gilli and Gilli (2013) and Hudson, Owens, and Flannes (2011).

[311] Farrell and Giustozzi (2013) examine the resilience of the Taliban in Afghanistan despite the heavy attrition they have suffered during almost a decade of Western-led counter-insurgency efforts.

[312] It has to be borne in mind that US-Pakistani relations had steadily deteriorated prior to the upsurge in drone warfare in Pakistan in 2008; in other words, drones have added to a cumulative series of factors that have contributed to worsening of bilateral relations since the late 1990s. On US-Pakistan relations, see also Fick (2009), Farshori (2013), and Markey (2013).

operatives and leaders. Networks, such as the Haqqani network in Pakistan, have not only survived to date but have arguably also been strengthened with new and more committed recruits. The Haqqani network has also turned more decisively against the government of Pakistan, thus weakening an important US/Western ally in the region, and it continues to undermine counter-terrorist and counter-insurgency efforts in both the Federally Administered Tribal Areas in Pakistan and areas with high Taliban presence in eastern and southern Afghanistan.

19. Pakistan is significantly more important a theatre for Western counter-terrorist operations than Afghanistan because of the training camps and operational/planning bases that the tribal areas offer to al-Qaeda and its affiliates. The underlying dynamic here also includes significant, but recently decreasing, levels of cooperation by the Pakistani government with US drone deployment.[313] In response to requests by the Pakistani government to eliminate high-value targets in their own counter-insurgency campaign, there has been a trend over time towards widening the potential targets of drone strikes beyond al-Qaeda. While this has contributed to ensuring at least tacit consent, if not active cooperation, from the Pakistani government (International Crisis Group 2013), it has also been counter-productive from a Western counter-terrorist perspective by reinforcing a common-enemy narrative among al-Qaeda and local insurgents (and the tribes with which they are affiliated). This is particularly problematic as tribes in Pakistan are very much in control of the areas in and from which al-Qaeda operates, with the latter having a "guest status". The more tribes are in a position in which they feel they need to support and protect their guests, the more difficult it is to achieve counter-terrorist objectives. While the relatively small and compact tribal territories in Pakistan continue to support a feasibility case for drone use, terrorist operatives have, with the assistance of tribal allies, been able to adapt their behaviour.

20. The picture is more mixed in Yemen. Here, drone strikes against Ansar al-Shari'a, the military wing of al-Qaeda in the Arabian Peninsula (AQAP) have effectively supported a campaign by Yemeni security forces in coalition with local tribal militias and routed AQAP from significant areas in the south that it had taken over in the course of 2011 and early 2012, forcing the terrorist group to retreat to remaining safe areas in the eastern mountains of Yemen, and denying it control of territory deemed essential for recruitment and as a launch pad for operations in Yemen and overseas. The combined effect of drone strikes and the campaign by local tribal and security forces has had a severely debilitating effect on AQAP and resulted in the group limiting its external operations (traditionally aimed at aviation targets) and focusing on more traditional guerilla tactics of only local reach. The relative effectiveness of the counter-terrorist campaign has also, at least temporarily, led to a reduction in the level of collusion between elements in the Yemeni regime and AQAP and tribal acquiescence to its presence and operations. While there can be no question that there has been some blowback in terms of public opinion,[314] there is no clear evidence that the drones campaign in Yemen has either strengthened the southern insurgency (which is motivated by secessionist demands), nor that it has increased the pool of potential recruits for AQAP domestically or internationally.

21. Similar to the situation in Pakistan, however, it is clear that AQAP's will and capability to remain al-Qaeda's most potent and dangerous affiliate has not been diminished by the drones campaign. Yet, as noted above, the group's aspirations, for the time being at least, remain locally focused and confined.[315] In other words, improved intelligence and continuing US-Yemen cooperation on counter-terrorism (Ghobari 2013), alongside the deployment of drones for both ISR and targeted killings (Reuters 2013), have effectively contained, but note eliminated, the threat posed by AQAP.

22. However, there is potentially a longer-term problem in Yemen in the sense that historically links between AQAP and local tribes are stronger than in Pakistan. While some tribes in the south did turn against AQAP in the course of 2012, others have retained close links with tribal leaders simultaneously serving as senior AQAP leaders. As such individuals get targeted in the course of the drones campaign, the potential for radicalizing entire tribes and turning them into AQAP foot soldiers and future leaders also increases. Moreover, those tribes that did turn against AQAP may also have done so more for opportunistic reasons than out of a strategic choice against terrorism and the ideology that AQAP stands for.

23. Increased support (limited or otherwise) for al-Qaeda and its affiliates in Afghanistan, Pakistan, and Yemen, however, has to be seen within a broader context. Such support is normally due to a whole range of factors, including widespread social, political, economic and other grievances that individuals harbour; and while drone use may be a contributing factor, it is unrealistic to draw direct and singular causal inferences from the correlation of drone use and increased al-Qaeda support. In turn, any successes can equally not solely be attributed to the use of drones either.

Beyond counter-terrorism: has drone warfare so far been an overall effective tool to increase national and international security?

24. It is difficult to draw clear conclusions, from the limited and anecdotal evidence available in the public domain, about the overall effectiveness of drone warfare for national and international security. This is so for two reasons. On the one hand, the evidence from the three cases—Afghanistan, Pakistan, Yemen—that have

[313] See, for example, a July 2013 report in The Express Tribune (2013), International Crisis Group (2013), and Landay (2013).

[314] This has been particularly the case in the context of the rapid intensification of the number and lethality of drone strikes in July and August 2013. See Eldemellawy (2013).

[315] The latest AQAP-related terror plot was entirely focused on targets within Yemen, including Western embassies (BBC News 2013) and parts of the country's critical oil infrastructure (Mukhashaf 2013).

seen well over 90% of recorded drone strikes, is decidedly mixed in terms of effects from both a counter-terrorist and counter-insurgency perspective. Terrorist groups in neither country have been able to mount any significant international operations since drones have been deployed there as essential components of US strategy. In this sense, at the very least there has been no short-term net-decrease in US (or other Western) national security as a result of deploying drones. Yet, security within these countries and the wider regions in which they lie, has not improved, and arguably worsened. Insurgent violence continues, government security forces struggle to cope, state institutions remain weak, corruption and transnational organized crime remain rampant posing threats beyond the borders of Afghanistan, Pakistan and Yemen.

25. On the other hand, and as noted earlier, it is difficult to establish clear causal links between these developments and the use of drones. Drone warfare by the US government (and, albeit to a more limited extent and confined to Afghanistan so far, by the UK) clearly is but one factor in a more complex picture of cause and effect. Drone operations capture international news headlines, but they are far fewer in number than special operations missions. While the latter also result in far fewer civilians being killed, they do have similar effects in terms of popular blowback against the United States, being seen as violations of sovereignty, culturally offensive, and creating a feeling of permanent insecurity and uncertainty—much like drones do. At the same time, in their ability to capture, rather than kill, high-value targets, they also play a role in achieving some of the positive effects in counter-terrorist campaigns.

26. In the context of counter-insurgency campaigns, it is worth remembering that the insurgencies now being countered, and effected by a parallel, but related, counter-terrorist campaign, have much longer and deeper roots and have not been caused by either US counter-terrorism in general or drone warfare in particular. However, it is also important not to deny that there have been a number of unintended and undesirable consequences of drone warfare from a counter-insurgency perspective, including the strengthening of insurgencies in Pakistan and Afghanistan, the increasingly difficult relations between the United States and the governments of both countries, and the rising sense of anti-Americanism among local populations.[316] While the latter is also exploited by political players across the entire spectrum for their own more limited power games, the use of drones for targeted killing (and to a lesser extent ISR), and the loss of civilian life and physical destruction that it brings with it, have strengthened narratives that make desirable domestic political solutions in Afghanistan and Pakistan at least more difficult (Mariet D'Souza 2009, Zaidi 2010a, b).

27. Seen purely from a national security perspective, the available evidence to date, bearing in mind the above caveats, does suggest that drone warfare can be an effective tool in combination with others in the wider arsenal of counter-terrorism if used selectively, judiciously, and as a means of last resort, including in the prevention of acts of terrorism. This is important from a national security perspective, and it is important to realize that, at the same time and in the short term, the US government (and other allies') national security does not equally depend on successful counter-insurgency. There is an argument that the failure of counter-insurgency will eventually render current counter-terrorist successes worthless as it will enable a re-grouping and resurgence of terrorist groups and their capabilities to strike at US and Western domestic and overseas interests in the long-term, because it does not destroy their networks. However, there is at this stage limited evidence to suggest an effective counter-terrorist campaign, including target hardening at home and abroad, could not continue to contain such resurgent terrorist threats even in the longer term.

28. In other words, when keeping the objectives of counter-terrorism and counter-insurgency distinct and separate, and prioritizing counter-terrorism over counter-insurgency, drone warfare, as one element of counter-terrorism, can contribute to achieving the desired positive net-effect for national security at considerably lower cost and loss of live among US armed forces than alternative approaches, such as the large-scale use of expeditionary ground forces which, even if deployed for purely counter-terrorist purposes, would be much more likely to be drawn into local insurgencies, to attract foreign terrorist operatives keen to target US assets otherwise beyond their reach, and to suffer significant casualties.

29. Two significant caveats need to be borne in mind in this context. First, the permanent elimination of terrorist threats, to the extent that this will ever be possible, will depend on sustainable political settlements in countries like Afghanistan, Pakistan, and Yemen, and thus, from today's perspective, at least in part on a successful counter-insurgency campaign. This, however, will be a very costly, long-term effort in which the US and its Western allies can play a supporting role, but in which local governments need to be the key players. Such a strategy would not preclude the continuation of at least selective use of counter-terrorist tools, including the use of drones in kinetic and ISR operations.

30. Second, the US (and UK) drone campaign to date has faced significant criticism and a degree of adaptation by targets, but has not yet encountered any systematic defensive or offensive counter measures. In other words, it has been conducted in an environment largely free from adversaries with counter-drone capabilities.[317] It is unlikely that this situation will prevail forever; and while drone technology will also become more and more advanced and capable, the arguable relative success that drone warfare has had to date

[316] The compatibility of counter-terrorism and counter-insurgency strategies in Afghanistan and Pakistan in particular has been covered widely in existing literature, the consensus broadly being that current counter-terrorist efforts negatively impact upon counter-insurgency efforts. See, for example, Aslam (2012) and (Boyle (2013), 2010)). For a contrasting view, see Exum *et al* (2009).

[317] There have been very few reported and confirmed incidents of drones being attacked or shot down, but Iran has reportedly captured US drones (The Guardian 2013, BBC News 2011) and attacked one with fighter jets (BBC News 2012).

needs to be assessed in this context of virtually unchallenged operations. This, too, calls for a broader approach in which drones are not the sole tool of counter-terrorist strategy and in which their deployment is not critical to its overall success.

Conclusion: Looking Ahead to Future UK Drones Policy

31. Drones have clearly become, and will remain, a fixture in a number of traditional and non-traditional combat theatres, including an expansion of drones for ISR use into the Sahel and Maghreb, as well as possibly Syria—areas which currently attract a large number of foreign jihadist fighters. This may be a temporary phenomenon due to the on-going instability in these areas, but it could also be sign of things to come with the continuing penetration by al-Qaeda of spaces with limited, if any, permanent state control, social unrest and economic deprivation. Moreover, Syria as a future theatre of drone operations would most likely then also draw in Israel and Hezbollah, possibly also Turkey, as major players deploying drones and risking a further serious escalation and linking of on-going conflicts in the region.

32. In these and other areas, the determination of which will depend on an assessment of where major al-Qaeda threats exist, the predominant initial use is likely to be ISR, with relatively high thresholds for initial targeted strikes. Yet, as in Pakistan and Yemen, the number of "legitimate" targets will increase over time as will the number of drone strikes.

33. While the present focus is primarily on the use of aerial drones and their deployment by the United States (and to a lesser extent the United Kingdom and Israel) in ISR and strike operations in counter-terrorist campaigns, their potential extends far beyond these current purposes and users. While the US has established a clear quantitative and qualitative advantage, in line with its broader conventional and other military dominance, it is likely that other countries, including potential adversaries, will invest greater resources in developing or otherwise acquiring their own drones and counter-drones capabilities. It may be too early to speak of an impending drones arms race, but proliferation of drones technology and capability is already evident, including to non-state actors. Similarly, it will be important to monitor the development of counter-drone capabilities by potential state and non-state adversaries, which in turn will have an impact on capability enhancement of current drone technology, including into the area of fully autonomous systems.

34. This may mean that future diplomatic efforts may be required to negotiate an international regulatory regime for the development, acquisition, and use of drone technology. Until such time that this is deemed feasible and desirable, however, it is important that existing national and international legal frameworks be observed and that their application to the use of drones is transparent. This must include greater public clarity about the distinction between counter-terrorist and counter-insurgency objectives, their relationship to national and international security interests, and the rationale behind prioritizing one over the other (or not).

September 2013

References

Aaronson, Michael, and Adrian Johnson, eds. 2013. *Hitting the Target? How New Capabilities are Shaping International Intervention, Whitehall Report*. London: Royal United Services Institute.

Ahmad, Ishtiaq. 2010. "The U.S. Af-Pak Strategy: Challenges and Opportunities for Pakistan." *Asian Affairs: An American Review* no. 37 (4):191–209. doi: 10.1080/00927678.2010.520572.

Aslam, M W. 2012. "Understanding the 'Pak' in 'AfPak': the Obama administration's security policy for Pakistan at the mid-term." *Journal of Policing, Intelligence and Counter Terrorism* no. 7 (1):2–21. doi: 10.1080/18335330.2012.653191.

Bachmann, Sascha-Dominik. 2013. "Targeted Killings: Contemporary Challenges, Risks and Opportunities." *J Conflict Security Law* no. 18 (2):259–288. doi: 10.1093/jcsl/krt007.

BBC News. 2011. *Iran reject US request to return captured drone*. 13 December 2011. Available from http://ow.ly/o5by4. Accessed: 20 August 2013.

BBC News. 2012. *Iranian jets "fired on US drone"*. 8 November 2012. Available from http://ow.ly/o5bnL. Accessed: 20 August 2013.

BBC News. 2013. *Yemen warning as temporary closure of UK embassy begins* 4 August 2013. Available from http://ow.ly/o3AOD. Accessed: 19 August 2013.

Boothby, William. 2012. "Some legal challenges posed by remote attack." *International Review of the Red Cross* no. 94 (886):579–595. doi: doi:10.1017/S1816383112000719.

Boyle, Ashley S. 2012. Contextualizing the Drones Debate. Washington, D.C.: American Security Project.

Boyle, Michael J. 2010. "Do counterterrorism and counterinsurgency go together?" *International Affairs* no. 86 (2):333–353. doi: 10.1111/j.1468–2346.2010.00885.x.

Boyle, Michael J. 2013. "The costs and consequences of drone warfare." *International Affairs* no. 89 (1):1–29. doi: 10.1111/1468–2346.12002.

Brown, Hayes. 2013. *Report: U.S. Drops Signature Strikes In Pakistan*. Available from http://ow.ly/nM4Nn. Accessed: 26 July 2013.

Byman, Daniel. 2013. *Why Drones Work: The Case for Washington's Weapon of Choice' versus Audrey Kurth Cronin, "Why Drones Fail: When tactics Drive Strategy"* in Vol.92, No. 4 July/August 2013 pp.32–55. 19 June 2013. Available from http://ow.ly/nMbXa. Accessed: 21 June 2013.

Callahan, Devon, Paulo Shakarian, Jeffrey Nielsen, and Anthony N. Johnson. 2012. Shaping Operations to Attack Robust Terror Networks. West Point: United States Military Academy.

Cogan, Charles. 2004. "Hunters not Gatherers: Intelligence in the Twenty-First Century." *Intelligence and National Security* no. 19 (2):304–321. doi: 10.1080/0268452042000302010.

Cronin, Audrey Kurth. 2013. *Why Drones Fail: When Tactics Drive Strategy.* 19 June 2013. Available from http://ow.ly/nMcf9. Accessed: 21 June 2013.

David, Steven R. 2003. "Israel's Policy of Targeted Killing." *Ethics & International Affairs* no. 17 (1):111–126. doi: 10.1111/j.1747–7093.2003.tb00422.x.

Davies, Nicolas J. S. 2009. "The Caroline Case and American Drone Strikes in Pakistan." *Peace Review* no. 21 (4):429–436. doi: 10.1080/10402650903323397.

Dworkin, Anthony. 2013. Drones and Targeted Killing: Defining a European Position. London: European Council on Foreign Relations.

Eldemellawy, Ghada. 2013. *Yemen: The first steps towards criminalising drone strikes, Obama take note*. Available from http://ow.ly/nM48S. Accessed: 5 August 2013.

Exum, Andrew M, Nathaniel C Fick, Ahmed A Humayun, and David J Kilcullen. 2009. The next 12 months in AfPak. Washington, D.C.: Center for a New American Security.

Farrell, Theo, and Antonio Giustozzi. 2013. "The Taliban at war: inside the Helmand insurgency, 2004–2012." *International Affairs* no. 89 (4):845–871. doi: 10.1111/1468–2346.12048.

Farshori, Kokab. 2013. US, *Pakistan Face Challenges to Keep Relations Steady.* 13 June 2013. Available from http://ow.ly/nMfYc. Accessed: 16 June 2013.

2009. Senate Committee on Homleand Security and Governmental Affairs. *From Strategy to Implementation: Strengthening U.S.-Pakistan Relations*. 7 July 2009.

Galliott, Jai C. 2012. "Closing with Completeness: The Asymmetric Drone Warfare Debate." *Journal of Military Ethics* no. 11 (4):353–356. doi: 10.1080/15027570.2012.760245.

Gannon, Kathy, and Sebastian Abbot. 2013. *Criticism alters US drone program in Pakistan*. Available from http://ow.ly/nM3if. Accessed: 26 July 2013.

Geiß, Robin, and Michael Siegrist. 2011. "Has the armed conflict in Afghanistan affected the rules on the conduct of hostilities?" *International Review of the Red Cross* no. 93 (881):11–46. doi: doi:10.1017/S1816383111000191.

Ghobari, Mohammed. 2013. *Yemen leader basks in U.S. favor as drone strikes fuel rage*. 13 August 2013. Available from http://ow.ly/o3CDr. Accessed: 19 August 2013.

Gilli, Andrea, and Mauro Gilli. 2013. Attack of the Drones. In *ISA Annual Convention*. San Francisco, CA.

Gray, Christine. 2013. "Targeted Killings: Recent US Attempts to Create a Legal Framework." *Current Legal Problems*:cut007. doi: 10.1093/clp/cut007.

Hardy, John, and Paul Lushenko. 2012. "The High Value of Targeting: A Conceptual Model for Using HVT against a Networked Enemy." *Defence Studies* no. 12 (3):413–433. doi: 10.1080/14702436.2012.703845.

Heller, Kevin Jon. 2013. "'One Hell of a Killing Machine': Signature Strikes and International Law." *J Int Criminal Justice* no. 11 (1):89–119. doi: 10.1093/jicj/mqs093.

Hudson, Leila, Colin S Owens, and David J Callen. 2012. "Drone Warfare in Yemen: Fostering Emirates Through Counterterrorism?" *Middle East Policy* no. 19 (3):142–156. doi: 10.1111/j.1475–4967.2012.00554.x.

Hudson, Leila, Colin S. Owens, and Matt Flannes. 2011. "Drone Warfare: Blowback from the New American Way of War." *Middle East Policy* no. 18 (3):122–132. doi: 10.1111/j.1475–4967.2011.00502.x.

Hull, E.J. 2011. *High-Value Target: Countering Al Qaeda in Yemen*: Potomac Books.

International Crisis Group. 2013. Drones: Myths And Reality In Pakistan. Brussels: International Crisis Group.

Kretzmer, David. 2005. "Targeted Killing of Suspected Terrorists: Extra-Judicial Executions or Legitimate Means of Defence?" *Eur J Int Law* no. 16 (2):171–212. doi: 10.1093/ejil/chi114.

Kroenig, Matthew, and Barry Pavel. 2012. "How to Deter Terrorism." *The Washington Quarterly* no. 35 (2):21–36. doi: 10.1080/0163660X.2012.665339.

Landay, Jonathan S. 2013. *U.S. secret: CIA collaborated with Pakistan spy agency in drone war*. 9 April 2013. Available from http://ow.ly/nMgkM. Accessed: 16 June 2013.

Lin, Kanhong. 2010. "Tribalwashing Yemen: US Policy Drones On, Missing the Real Story." *Anthropology News* no. 51 (5):28–28. doi: 10.1111/j.1556–3502.2010.51528.x.

Mariet D'Souza, Shanthie. 2009. "Talking to the Taliban: Will it Ensure 'Peace' in Afghanistan?" *Strategic Analysis* no. 33 (2):254–272. doi: 10.1080/09700160802702650.

Markey, Daniel. 2013. *A New Drone Deal For Pakistan: How to Bargain With a Newly Drone-Skeptical Islamabad*. Available from http://ow.ly/nM31k. Accessed: 9 August 2013.

Miller, Richard W. 2011. "The Ethics of America's Afghan War." *Ethics & International Affairs* no. 25 (02):103–131. doi: doi:10.1017/S0892679411000098.

Mukhashaf, Mohammed. 2013. *Gunmen kill five Yemeni troops guarding LNG plant*. 11 August 2013. Available from http://ow.ly/o3Biy. Accessed: 19 August 2013.

O'Hanlon, Michael, and Bruce Riedel. 2010. "Plan A-Minus for Afghanistan." *The Washington Quarterly* no. 34 (1):123–132. doi: 10.1080/0163660X.2011.538308.

Panetta, Leon. 2009. "AFPAK Drone Strikes Are Only Game in Town." *New Perspectives Quarterly* no. 26 (3):33–39. doi: 10.1111/j.1540–5842.2009.01090.x.

Patterson, Eric, and Teresa Casale. 2005. "Targeting Terror: The Ethical and Practical Implications of Targeted Killing." *International Journal of Intelligence and Counter Intelligence* no. 18 (4):638–652. doi: 10.1080/08850600590945407.

Phillips, S. 2011. *Yemen and the Politics of Permanent Crisis*: Routledge for the International Institute for Strategic Studies.

Plaw, Avery. 2013. Counting the Dead: The Proportionality of Predation in Pakistan. In *ISA Annual Convention*. San Francisco, CA.

Reuters. 2013. *Two suspected al Qaeda militants killed in Yemen drone strike*. 13 August 2013. Available from http://ow.ly/o3DdA. Accessed: 19 August 2013.

Satia, Priya. 2009. "From Colonial Air Attacks to Drones in Pakistan." *New Perspectives Quarterly* no. 26 (3):34–37. doi: 10.1111/j.1540–5842.2009.01091.x.

Schmitt, Eric. 2013. *Drones in Niger Reflect New U.S. Tack on Terrorism*. Available from http://ow.ly/nM4lh. Accessed: 29 July 2013.

Schmitt, Michael N. 2010. "Drone Attacks under the Jus ad Bellum And Jus in Bello: Clearing the 'Fog of Law'." *Yearbook of International Humanitarian Law* no. 13:311–326. doi: doi:10.1007/978–90–6704–811–8_9.

Shields, Ian, and James Spencer. 2011. "An Unmanned Future for Naval Aviation." *The RUSI Journal* no. 156 (6):48–54. doi: 10.1080/03071847.2011.642687.

Sohlman, Eva. 2011. "Yemen Fractures on the Brink of Civil War as Al-Qaeda Gains Ground." *American Foreign Policy Interests* no. 33 (5):236–240. doi: 10.1080/10803920.2011.620517.

Strawser, Bradley Jay. 2010. "Moral Predators: The Duty to Employ Uninhabited Aerial Vehicles." *Journal of Military Ethics* no. 9 (4):342–368. doi: 10.1080/15027570.2010.536403.

Synnott, Hilary. 2009. "Transforming Pakistan: Ways out of instability." *The Adelphi Papers* no. 49 (406). doi: 10.1080/19445570903235062.

The Bureau of Investigative Journalism. 2013. *Pakistan drone statistics visualised*. 2 July 2013. Available from http://ow.ly/o3hPo. Accessed: 19 August 2013.

The Guardian. 2013. *Iran to teach drone-hunting to school students*. 19 August 2013. Available from http://ow.ly/o5al6. Accessed: 20 August 2013.

Tribune, The Express. 2013. *Leaked report reveals Pakistan-US "understanding" on drones*. 9 July 2013. Available from http://ow.ly/nM3GY. Accessed: 10 July 2013.

Williams, Brian Glyn. 2010. "The CIA's Covert Predator Drone War in Pakistan, 2004–2010: The History of an Assassination Campaign." *Studies in Conflict & Terrorism* no. 33 (10):871–892. doi: 10.1080/1057610X.2010.508483.

Williams, Brian Glyn. 2013. The Pro Argument for Drone Strikes in Pakistan. In *ISA Annual Convention*. San Francisco, CA.

Wilner, Alex S. 2010. "Targeted Killings in Afghanistan: Measuring Coercion and Deterrence in Counterterrorism and Counterinsurgency." *Studies in Conflict & Terrorism* no. 33 (4):307–329. doi: 10.1080/10576100903582543.

Zaidi, Syed Manzar Abbas. 2009. "Hating the Taliban, Hating the United States: Trajectories of Pakistan's Anti-Americanism." *American Foreign Policy Interests* no. 31 (6):376–388. doi: 10.1080/10803920903417613.

Zaidi, Syed Manzar Abbas. 2010a. "Alternative Hard COIN Strategies for Pakistan." *American Foreign Policy Interests* no. 32 (5):313–327. doi: 10.1080/10803920.2010.517126.

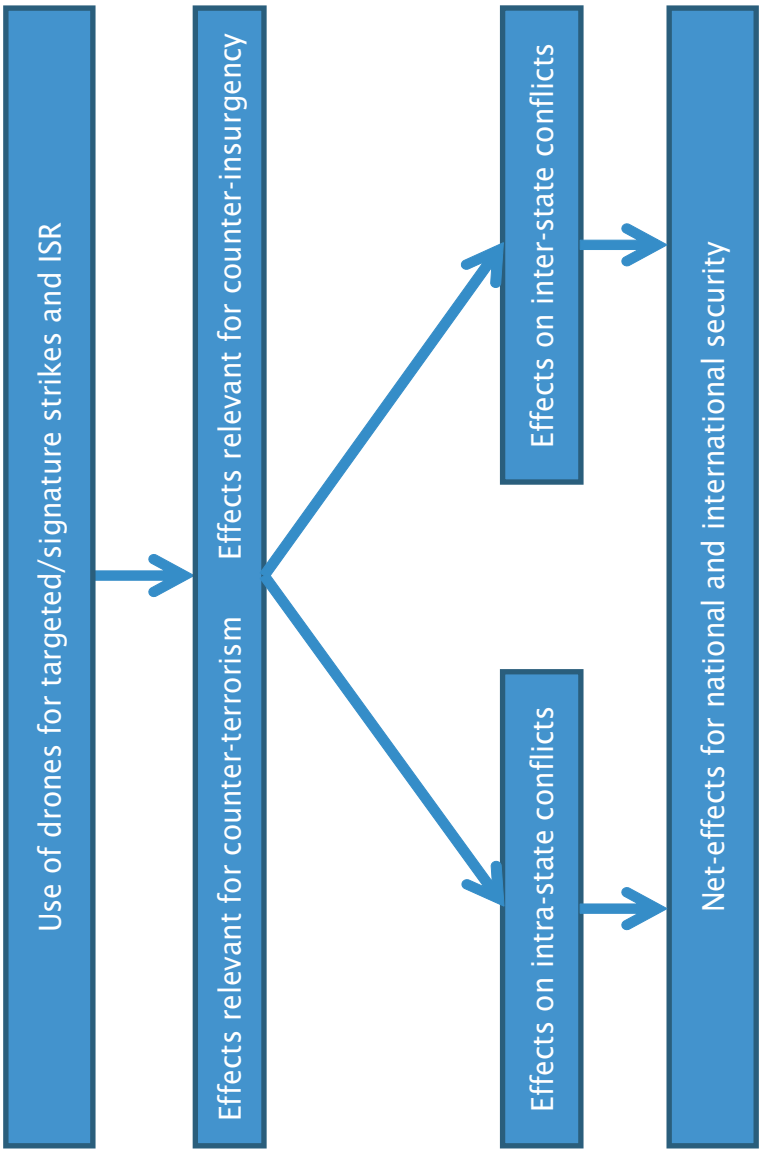
Zaidi, Syed Manzar Abbas. 2010b. "Negotiations and the Anti-Taliban Counterinsurgency in Pakistan." *Asian Politics & Policy* no. 2 (2):257–277. doi: 10.1111/j.1943–0787.2010.01187.x.

Zenko, Micah. 2012. *America's Failing Drone War in Yemen*. 26 December 2012. Available from http://ow.ly/nMlqe. Accessed: 27 December 2012.

Zenko, Micah. 2013. *Drone Strikes and Civilian Casualties in Afghanistan*. Available from http://ow.ly/nM3b8. Accessed: 9 August 2013.

Figure 1

THE EFFECT OF THE USE OF DRONES



Written evidence submitted by MBDA UK Ltd

Background

MBDA, a leading global missile and missile systems company, is a multi-national group with 10,000 employees across France, the UK, Italy, Germany, Spain and the USA. MBDA has three major shareholders—BAE Systems (37.5%), EADS (37.5%) and Finmeccanica (25%), and is the first truly integrated European defence company. In the UK MBDA employs over 3,000 people at sites in Stevenage, Bristol and Bolton, with the vast majority being highly skilled and qualified engineers and systems designers. UK turnover in 2012 was 885 million Euros (£718 million).

Remotely Piloted Air Systems (RPAS)

The question of RPAS use is not, in itself, one on which MBDA takes a view. RPAS are operated by highly trained and qualified pilots who adhere to the same strict Rules of Engagement as other platforms. Hence, the important question is not about the platform itself but about what the platform is used for. As the former Chief of the Air Staff, Sir Stephen Dalton recently said, "They [RPAS] change the platform from which effects can be achieved, not the effects themselves nor the legal and ethical framework that underpins everything we do."

It is here that MBDA's chosen design and manufacturing philosophy—that of striving for greater accuracy—becomes important. An RPAS equipped with reliable and accurate missile systems are able to deliver the desired operational effect with a much smaller warhead charge than those equipped with less accurate weapons. Furthermore, the use of reliable and accurate missile systems increases the number of opportunities available to engage legitimate targets, including some that would ordinarily be considered too difficult to attack, with confidence that the risk of causing unintended collateral damage had been significantly reduced. Accuracy also means that the cost per successful engagement is minimised.

So by using accuracy as a measure of success, we are able to meet the needs of our customers whilst also seeking to meet the most stringent test in modern warfare—the extent to which you are able to minimise collateral damage and civilian mortality whilst preserving military superiority and meeting political demands.

November 2013

Written evidence submitted by Reprieve

I. Summary

The RPAS or "drone" programmes of the UK and the US are closely intertwined, in a number of ways:

- The UK shares intelligence with the US in order to support its programme of covert drone strikes, carried out by the CIA and Special Operations in Pakistan, Yemen and Somalia;
- The UK Government and UK companies provide communications networks without which the US would not be able to operate this programme;
- The US is able to make use of RPAS airframes belonging to the RAF;
- UK companies manufacture key drone components, and are allowed to export them to the US by the UK Department for Business.

This is a matter of concern as the US covert drone programme—carried out by the CIA and Special Forces in Pakistan, Yemen, and Somalia—in which the UK is involved, is illegal and has a number of negative consequences:

- It violates both international law and the domestic law of the target countries, with the Peshawar High Court in Pakistan declaring earlier this year that it is a war crime.
- In its effects on the populations of the areas it targets, it violates a number of human rights, including the right to life, and freedom from cruel, inhuman or degrading treatment; the UN Secretary General has also noted its impact on children's rights.
- It is counter-productive, having been described as the "recruiting tool of choice for militants," with a number of military and intelligence figures raising similar concerns; and therefore may in fact constitute a threat, rather than a contribution, towards UK security.
- It risks setting an international precedent for the use of such covert drone strikes by other states—such as Iran or China.

II. Introduction

1. Reprieve is a legal charity which seeks to uphold the rule of law and the rights of individuals around the world—with a specific focus on death penalty cases and abuses committed under the umbrella of the "War on Terror".

2. Since early 2011, Reprieve has been investigating the use of RPAS, commonly known as "drones", to carry out covert strikes outside of declared warzones—primarily, in Pakistan, Yemen and Somalia. Reprieve's

investigations have included the role played by the UK in facilitating the covert strikes carried out by US bodies including the CIA and JSOC (Joint Special Operations Command). As part of its work, Reprieve also represents a number of relatives of civilians killed—in Reprieve's view, illegally—in such covert strikes.

3. Reprieve's evidence to the committee will focus on two main areas: firstly, the existing overlap between UK and US drone activity, in terms of covert strikes in non-warzones; and secondly, the ethical and legal context of the drone programme, which will explain why the UK's close involvement in it is a serious problem which must be addressed. This will include written testimony provided to the committee by a relative of two Yemeni civilians killed by a US strike in 2012. It will also briefly address the counter-productive nature of the campaign, which poses a potential threat to the UK's future security.

III. A Short Note on Terminology

4. Throughout this evidence, the shorthand terms of "covert drone campaign/programme/strikes" will be used for the sake of brevity—although we recognize that the military itself uses a variety of terms, including "RPAS", "UAV" and U-CASS to describe the aircraft itself.

5. It is worth stressing that Reprieve's focus is on *how* this technology is used in the covert programme, rather than the technology itself (although the two can never be entirely separated). For that reason, the UK military's use of RPAS in "legitimate" war zones such as Afghanistan will not be covered—except where it may overlap with the "illegitimate" use of RPAS over the border in Pakistan.

IV. UK Involvement in the US Covert Drone Programme

6. The US's covert drone programme overlaps with the operations of UK Armed Forces, intelligence services and Government departments in a number of ways:

- intelligence-sharing, by which the UK helps to support the programme;
- the provision, by the UK Government and UK firms, of communications networks without which the drones could not be operated;
- the potential sharing of the RPAS airframes themselves between the UK and US; and
- the granting of export licenses by the British Government for crucial RPAS components, manufactured in the UK.

A. *Intelligence-sharing*

7. In 2010, it was reported in several media outlets including The *Sunday Times*, on the basis of a briefing said to emanate from official sources, that GCHQ provides "locational intelligence" to the US authorities for use in drone strikes in Pakistan, amongst other places. The reports appeared to quote a GCHQ source as saying that the assistance afforded by GCHQ to the US authorities was "in 'strict accordance' with the law".[1] The Government, however, has declined either to confirm or to deny the existence of the policy, or whether any such policy would be unlawful as a matter of international and domestic law.

8. Other countries, however, have taken a different approach to intelligence sharing amid concerns they potentially violate both international and domestic law. In 2011, the German Interior Ministry issued new, more restrictive rules on intelligence sharing. It instructed its domestic intelligence service, the Bundesamt fr Verfassungsschutz (BfV), to stop providing the U.S. with current information that would make it possible to determine the location of German citizens.[2]

B. *Communications networks*

9. Reprieve's investigators recently found evidence that both the British state and a British firm—BT—may be providing key communications infrastructure for the US covert drone programme. The US Defense Information Systems Agency (DISA) was found to have contracted with BT (formerly British Telecom) to provide telecommunications services between Camp Lemonier in Djibouti and RAF Croughton in Northamptonshire.[3]

10. Camp Lemonier is a key centre for US covert drone operations in Yemen and Somalia. In 2012, the Washington Post described it as "the U.S. military's first permanent drone war base."[4] It has been described by The Economist as "the most important base for drone operations outside the war zone of Afghanistan", from where Predator drones take off "round the clock" on missions in nearby Yemen and Somalia.[5]

11. RAF Croughton is leased by the US and used for military communications—providing "world-class combat support enabling communications and global strike operations" according to the USAF's 501st Combat Air Support Wing.[6]

12. It therefore seems highly likely that communications infrastructure linking the two bases will carry information for use in covert drone operations and/or video feeds from drones—as it is known that, while the drones may take off and land from Lemonier, they are operated remotely from elsewhere. For that reason, the communications networks which link the bases in Lemonier and elsewhere with the drone pilots' ground control stations—thought to be in the US—are an indispensable part of the overall system.

13. In response to concerns raised by Reprieve, BT has said that it is "comfortable having the US government as a client," and that "what they do with it [the service provided by BT] is their concern rather than ours."[7] Responding to questions in Parliament, ministers have only stated that:

> "RAF Croughton is part of a worldwide US Defence communications network, and the base supports a variety of communications activity. The Ministry of Defence does not hold information on what support to US operations is provided by RAF Croughton."[8]

C. *Drone sharing*

14. The close inter-relation between the UK and US drone programme has long been known—for example, until recently RAF pilots flew drones over Afghanistan from a USAF base in Nevada. However, a recent ministerial answer in Parliament shows this interaction to go still further, by confirming that the US may make use of UK drones under something called the "Reaper agreement".

15. Defence Minister Andrew Robathan told Parliament on 12 June this year that: "Under the Reaper agreement the United States Air Force (USAF) may request use of a UK Reaper airframe."[9]

16. This raises further concerns over Britain's part in the US' covert drone campaign, given that there appear to be considerable grey areas between the use of RPAS airframes by the US Armed Forces and the CIA. *Wired* has reported that: "the CIA sometimes borrows the Air Force's drone fleet,"[10] and, according to the *Washington Post*, "The [Obama] administration has touted the collaboration between the CIA and the military in counterterrorism operations, contributing to a blurring of their traditional roles. In Yemen, the CIA routinely 'borrows' the aircraft of the military's Joint Special Operations Command to carry out strikes."[11]

17. The concern is that Britain's drones are in effect part of a pool of airframes on which US forces can draw—which is problematic given the reported lack of clear lines between the US' use of drones in legitimate theatres of war, and their use of them in non-war zones to carry out "targeted killings" which are widely considered to be illegal. Moreover, as noted above, that pool may be used not only by traditional military forces, but also by the CIA, a civilian intelligence gathering agency that does not enjoy combatant immunity under international law. British ministers have so far failed to provide assurances on what—if any—safeguards are in place to ensure British RPAS airframes cannot be used in such cases, or further detail on the exact provisions of the "Reaper agreement".

D. *Export controls*

18. Another way in which the UK may be implicated in the US's drone operations is through the supply of components by British companies. The UK maintains a "consolidated list of strategic and dual-use items that require export authorization" (the "Consolidated List"), which is intended to include all military and dual-use items requiring an export licence.

19. When considering whether to grant an export license, the Department for Business (BIS) has stated that it applies the "Consolidated EU and National Arms Export Licensing Criteria" (the "Consolidated Criteria"), which include "respect of human rights", "preservation of regional peace, security and stability" and "the behaviour of the buyer country with regard to ... respect for international law". In recent correspondence with Reprieve, BIS has indicated that it has granted licenses for the export of goods which are intended for use by the US government in weaponised drones. BIS further stated that the current advice of the FCO and the MOD is that granting such licences would not breach the Consolidated Criteria. In light of the illegality of the covert drone programme and the human rights violations that result from it, this position is of great concern, and risks undermining the purpose for which arms export controls exist—and severely damaging the UK's international reputation.

20. Further, Reprieve is concerned that due to the constantly developing nature of drone technology, there are many components being produced in the UK which do not currently appear on the Consolidated List, and therefore may be exported without export licenses. BIS has indicated that it is unwilling to add certain components which we have identified to the Consolidated List, on the basis that this would be an export control "operating solely at the national level" and would therefore be ineffective, as it could easily be circumvented. We consider this position demonstrates that the system for controlling exports is failing to keep up with technological advances in warfare. If the UK refuses to consider amending the Consolidated List in the absence of EU consensus, it is highly likely that an increasing number of components will be exported without any governmental scrutiny at all, to recipient countries which may use these goods in violation of human rights.

V. Ethical and Legal Issues

A. *Illegality*

21. The UK's apparent areas of overlap with the US drones programme, as outlined above, risk implicating this country in violations of international law of the most serious nature. International law governs both when a state may resort to the use of force, as well as what conduct is acceptable in an armed conflict. These laws were developed and codified in the aftermath of World War II, in an effort to bring peace and stability to the international system. Since then, they have become customary international law, accepted universally among states. The US covert drone programme is in direct violation of these laws.

22. Article 2(4) of the UN Charter sets out a clear prohibition on "the threat or use of force by one state against another." The Charter contains two exceptions to this general ban on the use of force. The first can be found in Chapter VII, which gives the Security Council the right to authorize the use of force. The UN Security Council has not authorized the US or the UK to use force in Pakistan, Yemen or Somalia.

23. The second exception is found in Article 51, which grants states the right to self-defence. Even if one takes the most lenient reading of this exception by referring back to the 19th century case of the *Caroline*, anticipatory self-defence is only allowed when the necessity for it is "instant, overwhelming, and leaving no choice of means, and no moment for deliberation."[12] The US covert drone programme almost certainly does not meet this standard.

24. Consent may also act as an exception to the use of force. The U.S. has consistently claimed that it has the consent of the states involved, although this claim is strongly contested by Pakistan and the US has provided no evidence to date to counter this objection.

25. Even if the target country has given its consent, this consent does not make US drone strikes legal. It merely absolves the US of violating the sovereign territory of the country upon which the strikes are carried out. The US is still bound by rules of international human rights when it acts with the consenting state, unless the state is involved in an armed conflict. International human rights law requires a law enforcement approach. Such an approach prohibits the arbitrary deprivation of life except in the rare circumstance where there is a threat to life and *no other* means of preventing that threat to life. US drone strikes do not meet this strict legal test.

26. Whether a state is involved in an armed conflict is not determined merely by the declarations of a state. Customary international law dictates that in order for an armed conflict to exist, there must be both 1) the existence of organized armed groups, and 2) these armed groups must be engaged in fighting of some intensity.[13] Intensity is defined not only in terms of its severity, but also in terms of its duration. This intensity of fighting is absent in the countries involved, thereby making declarations that an armed conflict exists unsupported by international law.

27. Moreover, *even if there were* a declared armed conflict, such that international humanitarian law and not international human rights law applied, the legality of any drone strike must still then be assessed in accordance with fundamental principles of distinction, proportionality, humanity, and military necessity. "Living Under Drones," a study published by Stanford University and New York University in September 2012, was based on interviews with more than 60 people in North Waziristan, Pakistan—many of whom were survivors of strikes, with others having lost family members.[14] It documents substantial evidence to suggest that these criteria are not met by drone strikes in Pakistan—including the reported failure to distinguish between "civilian" and "militant" targets, the large number of people killed in strikes, and the timing of particular strikes, which do not appear to be in response to any particular threat. In particular, the *New York Times* revealed that the Obama administration considers "all military-age males [killed] in a strike zone" to be "combatants… unless there is explicit intelligence posthumously proving them innocent."[15] There is also significant use of "double" tap strikes, whereby the same area is hit by successive missiles, meaning rescuers have been struck.[16] The UN Special Rapporteur on extrajudicial, summary or arbitrary executions, Christof Heyns, has observed, "[I]f civilian 'rescuers' are indeed being intentionally targeted, there is no doubt about the law: those strikes are a war crime."[17]

28. Furthermore, under international humanitarian law, only members of armed forces qualify as lawful combatants. The CIA is not part of the US armed forces. It is a civilian intelligence agency and as such its officers are not immune from prosecution. In other words, while international humanitarian law allows soldiers to kill, it does not allow intelligence officers to kill. Those intelligence officers who do kill—and those who assist them in the killing—are potentially guilty of violations under both international and domestic law and, therefore, may be prosecuted for those crimes. Such a situation is not beyond the realm of possibility. In fact, in December 2010, a domestic murder case was lodged against the CIA station chief in Pakistan for his involvement in drone strikes in the country's Federally Administered Tribal Areas. The US was so concerned about the legitimacy of the case and the security of its operative, that it immediately pulled him from the country. A decision in that case is still pending, but in May 2013, another court in Pakistan—the Peshawar High Court—declared drone strikes to be war crimes, and ordered the Pakistani government, among other things, to appeal to the UN for a war crimes tribunal to be established.[18]

29. Concern about the US use of drones has already attracted at least one UN investigation. In January of this year, Ben Emmerson, the UN special rapporteur on human rights and counterterrorism, launched an investigation into the legality and impacts of drone strikes in Pakistan, Yemen, Somalia and Gaza.[19] He is due to report his findings to the UN Human Rights Council in March 2014.

B. *Human rights*

30. Even aside from the legality of specific strikes, the constant presence of US drones has had devastating human rights impacts for communities living in affected regions, due to their inability to protect themselves and their families from a strike, and the uncertainty as to when and where the next strike will happen. "Living Under Drones" noted that communities reported as many as six drones circling over a village at any one time and that the drones emitted a low buzzing noise which terrorized those living below with the possibility of

imminent death. Interviewees told the researchers that widespread fear of drones has led people to shy away from social gatherings, and inhibited their willingness to carry out day-to-day activities and important community functions, including attending school or funerals.

31. It is quite clear, therefore, that in addition to violating the right to life, the US use of drones in non-war zones infringes numerous human rights of those living in the affected areas, including the right to freedom from torture, cruel, inhuman or degrading treatment, to privacy, family life and a home, to education and to an adequate standard of health and well-being.

32. The impact of drones on children's rights, in particular, was recently highlighted in the Annual Report of the UN Secretary-General on Children and Armed Conflict.[20] This report noted an "increasingly worrisome number of reports of child casualties" in the course of drone strikes. It further reported that the mixed use of armed and surveillance drones has "resulted in permanent fear in some communities, affecting the psychosocial well-being of children and hindering the ability of such communities to protect their children". In addition, the Secretary-General highlighted the impact on access to education, in some cases due to fear among children of drone strikes.

33. The UK's close involvement in this programme, as set out above, is therefore of serious concern. Yet not only has the UK Government refused to engage with questions over their own involvement in the US' covert drone programme—they have also refused to engage with concerns over its illegality, continually stating simply that "the use of unmanned aerial vehicles (UAV) against terrorist targets is a matter for the states involved".[21] By not engaging with the concerns raised by US actions, the UK risks tacitly consenting to such behaviour, thereby undermining international law and setting potentially dangerous precedents for other states to follow in the future.

C. *Evidence from a Yemeni victim of drone strikes*

34. The following testimony is from Faisal bin Ali Jaber, whose brother-in-law and nephew were killed in a US drone strike in the Hadramout region of Yemen on 28 August 2012.[22] They were, respectively, a preacher who had spoken out on a number of occasions against Al Qaeda and a local police officer. Reprieve is representing Faisal in his attempts to secure justice for his family. Faisal provided this testimony for the Defence Select Committee via his representatives at Reprieve.

35. *My name is Faisal bin Ali Jaber and I am a Yemeni engineer. I was born in my family's ancestral village, Khashamir, located in southern Hadhramaut. Today, I live and work in Yemen's capital, Sana'a, in the field of environmental protection.*

36. *I sometimes find it hard to believe that our village was once a happy one. On the 28th of August last year, our village was celebrating both Eid and the marriage of my eldest son. We were all dancing and singing, enjoying the wedding festivities. But all this joy came to an abrupt end when US drones attacked our village in the evening of the 29th of August 2012. The strike was a very loud one- at least four missiles attacked the side of a mosque fifteen meters away from where we live.*

37. *Our village had never experienced something as tragic as that strike. Fear and panic quickly replaced the atmosphere of joy, with several people being admitted, suffering from shock. But I was more directly affected by this attack. I lost my dear brother in law, Salim, and my young nephew Walid. Salim was a local imam in Hadhramaut. He was especially known amongst the villagers for his continuous attempts to combat, through his Friday sermons and through religious education, al-Qaeda. I also lost my nephew in this attack. Walid was a 21 year old traffic policeman.*

38. *I have tried to seek justice for my brother-in-law and my nephew, and for all the victims of the US drone attacks in Yemen. When I heard that our President Hadi was visiting President Obama in the US, I wrote a letter to both of them. I asked them to explain to me why were Salim and Walid killed by drones on that night? What have they done? I have asked them to tell us why our village was attacked and why our province is still being attacked? Why the children and women of our province are still being terrorised in this way? We know how to challenge Al-Qaeda; we know that through education and awareness, we will be able to combat Al Qaeda and its ideology. But we are at loss as to how we can face the US drones that kill our innocent and terrorise us. I have not received any answers yet for my questions, and so I am now considering litigation. I want to use the full force of the law so that justice can finally be done.*

39. *I am concerned to hear that Britain may be involved in supporting these strikes, either through its intelligence agencies or through links between bases in the UK and the US base from which the drones over Yemen are operated. I would ask that the committee investigate fully the UK's role in the US' covert drone programme, and consider the terrible effect it has had on my family and many others like it.*

VI. Counter-productivity

40. Given Britain's role in the US' covert drone campaign, it is crucial to consider how much more or less secure the UK may be as a result of the campaign; and the related issue of how much more or less stable it makes the countries—such as Pakistan and Yemen—which it targets.

41. It should be noted that the warnings on the counter-productivity of the covert drone campaign do not come only from the "usual suspects," but also former senior figures in US military and intelligence. Robert Grenier, the Director of the CIA's Counter-Terrorism Center from 2004 to 2006, has said: "One wonders how many Yemenis may be moved in future to violent extremism in reaction to carelessly targeted missile strikes."[23] Michael Boyle, a former security adviser to President Obama, has warned that the covert drone campaign is "counter-productive,"[24] while Obama's former Director of National Intelligence, Denis C Blair, has warned that:

> "Our dogged persistence with the drone campaign is eroding our influence and damaging our ability to work with Pakistan to achieve…important security objectives."[25]

42. General Stanley McChrystal, the former US commander in Afghanistan, said in a recent interview:

> "What scares me about drone strikes is how they are perceived around the world…The resentment created by American use of unmanned strikes ... is much greater than the average American appreciates. They are hated on a visceral level [and exacerbate a] perception of American arrogance that says, 'Well we can fly where we want, we can shoot where we want, because we can.'"[26]

43. Meanwhile, the covert drone campaign has been found to be unpopular in those countries and regions which bear the brunt of the strikes. FCO research has found increasing opposition to drone strikes in the Federally Administered Tribal Areas (FATA) of Pakistan, with the proportion of respondents that believed that drone strikes were *never* justified rising "from 59% in 2010 to 63% in 2011."[27] Support for drone strikes across Pakistan as a whole continued to fall into 2012, with just 17% of those Pakistanis polled by Pew backing them.[28] In fact, drone strikes featured as one of the key issues in the country's most recent elections, with anti-drone sentiment leading all major political parties to declare that they would stop US drone strikes if elected.

44. In Yemen, perhaps the clearest indication has come from the National Dialogue, a non-partisan gathering of civil society which is mapping out the country's democratic future. Earlier this year, it voted to outlaw the covert drone strikes by an overwhelming majority.[29]

45. The *New York Times* has concluded that "drones have replaced Guantánamo as the recruiting tool of choice for militants."[30]

VII. Proliferation

46. The near monopoly the US, UK and others have enjoyed with respect to drones is quickly coming to an end. According to the US Government Accountability Office (GAO), the number of countries that have acquired drones has almost doubled over the past eight years, from 41 in 2004 to at least 76 in 2012.[31] As more and more countries acquire drones, there is a significant danger that current US (and possibly UK) practice are setting dangerous precedents for other countries to follow.

47. On 7 March 2013, members of the European Parliament expressed deep concern about the "unwelcome precedent" the US drone programme sets, citing its "destabilising effect on the international legal framework". They urged the European Union and its Member States to "speak up" against the dangerous precedent the US was setting and stressed that Europe has a "critical role" to play in this regard.[32]

48. The UK has a unique role to play in ensuring that US practice does not become the norm by which all other states operate drones. It needs to make transparent what it sees as the legal rules governing the use of drones, and where that approach differs from that of the U.S. Unless it does so, its silence will likely be taken as tacit agreement and used by states such as Iran and China to justify similar actions.

September 2013

Notes

[1] See "GCHQ finds Al-Qaeda for American strikes," *Sunday Times*, 25/07/2010—which reported that: "British spy agencies have been pinpointing the hiding places of Al-Qaeda and Taliban chiefs for controversial 'targeted killings' by US drones. GCHQ, the top-secret communications agency, has used telephone intercepts to provide the Americans with 'locational intelligence' on leading militants in Afghanistan and Pakistan, an official briefed on its operations said." http://www.thesundaytimes.co.uk/sto/news/uk_news/Defence/article353492.ece

[2] See "Drone Killing Debate: Germany Limits Information Exchange with US Intelligence," *Der Spiegel*, 17/03/2011 http://www.spiegel.de/international/germany/drone-killing-debate-germany-limits-information-exchange-with-us-intelligence-a-762873–2.html

[3] Further information can be found here: http://www.reprieve.org.uk/media/downloads/2013_07_15_PUB_Complaint_to_UK_NCP_re_BT_plc.pdf

[4] See "Remote U.S. base at core of secret operations," *Washington Post*, 25/10/2012 http://articles.washingtonpost.com/2012–10–25/world/35499227_1_drone-wars-drone-operations-military-base

[5] See "Death from afar," *The Economist*, 3/11/2012: http://www.economist.com/news/international/21565614-america-uses-drones-lot-secret-and-largely-unencumbered-declared-rules-worries

[6] See http://www.501csw.usafe.af.mil/units/croughton/

[7] For BT's comments, see "BT accused of aiding US lethal drone attacks," *Sunday Herald*, 21/07/2013: http://www.heraldscotland.com/news/home-news/bt-accused-of-aiding-us-lethal-drone-attacks.21654416 and "Officials examine BT link to drone deaths," *Computer Weekly*, 25/07/2013: http://www.computerweekly.com/blogs/public-sector/2013/07/investigation-to-seek-bt-link.html

[8] Hansard, 25/03/2013, answer given by Minister of State for the Armed Forces Andrew Robathan: http://www.publications.parliament.uk/pa/cm201213/cmhansrd/cm130325/text/130325w0002.htm#130325w0002.htm_wqn78

[9] Hansard, 12/06/2013: http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm130612/text/130612w0001.htm

[10] "Little will change if the military takes over CIA's drone strikes," *Wired*, 20/03/2013: http://www.wired.com/dangerroom/2013/03/military-drones

[11] "CIA seeks to expand drone fleet, officials say," *Washington Post*, 18/10/2012: http://articles.washingtonpost.com/2012–10–18/world/35502344_1_qaeda-drone-fleet-cia-drones

[12] ???

[13] *See* International Law Association, Use of Force Committee, Final Report on The Meaning of Armed Conflict in International Law (Aug. 2010), *available at* http://www.ila-hq.org.

[14] http://www.livingunderdrones.org/—see in particular pages 30–35, Chapter 3 and 112–117.

[15] "Secret 'kill list' proves a test of Obama's principles and will," *New York Times*, 29/05/2012: http://www.nytimes.com/2012/05/29/world/obamas-leadership-in-war-on-al-qaeda.html?pagewanted=all&_r=0

[16] See "Living Under Drones," pp 74–76.

[17] "UN expert labels CIA tactic exposed by Bureau 'a war crime,'" The Bureau of Investigative Journalism, 21/06/2012: http://www.thebureauinvestigates.com/2012/06/21/un-expert-labels-cia-tactic-exposed-by-bureau-a-war-crime/

[18] "Pakistani court declares US drone strikes in the country's tribal belt illegal," *The Independent*, 19/05/2013: http://www.independent.co.uk/news/world/asia/pakistani-court-declares-us-drone-strikes-in-the-countrys-tribal-belt-illegal-8609843.html

[19] "UN launches major investigation into civilian drone deaths," The Bureau of Investigative Journalism, 24/01/2013: http://www.thebureauinvestigates.com/2013/01/24/un-launches-major-investigation-into-civilian-drone-deaths/

[20] http://childrenandarmedconflict.un.org/annual-report-of-the-secretary-general-on-children-and-armed-conflict/

[21] See, for example, Foreign Office Minister Baroness Warsi on 22 April 2013: "The Government's position is that the use of unmanned aerial vehicles (UAV) against terrorist targets is a matter for the states involved." Hansard: http://www.publications.parliament.uk/pa/ld201213/ldhansrd/text/130422w0001.htm#wa_st_89

[22] The *New York Times* reported on the strike on 05/02/2013: "Drone strikes' risks to get rare moment in the public eye,": http://www.nytimes.com/2013/02/06/world/middleeast/with-brennan-pick-a-light-on-drone-strikes-hazards.html?pagewanted=all

[23] See "Yemen and the US: Down a familiar path," *Al Jazeera English*, 10/05/2012: http://www.aljazeera.com/indepth/opinion/2012/05/201251071458557719.html

[24] "US drone attacks 'counter-productive', former Obama security adviser claims," *The Guardian*, 7/01/2013: http://www.theguardian.com/world/2013/jan/07/obama-adviser-criticises-drone-policy

[25] See *New York Times*, 14/08/2011: http://www.nytimes.com/2011/08/15/opinion/drones-alone-are-not-the-answer.html

[26] "Retired general cautions against overuse of 'hated' drones," Reuters, 07/01/2013: http://www.reuters.com/article/2013/01/07/us-usa-afghanistan-mcchrystal-idUSBRE90608O20130107

[27] Hansard, 16/05/2013, answer by Foreign Office Minister Alistair Burt: http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm130516/text/130516w0003.htm#130516w0003.htm_spnew0

[28] See "Pakistani Public Opinion Ever More Critical of U.S.," *Pew Research*, 27/06/2012: http://www.pewglobal.org/2012/06/27/pakistani-public-opinion-ever-more-critical-of-u-s/

[29] *Al Jazeera America* reported on 30 July this year that: "Recently, Yemen's National Dialogue Conference (NDC)—funded by the U.S.—passed a recommendation to criminalize U.S. drone strikes in the country. The NDC was established shortly after Saleh's ouster with the aim of facilitating a transition to democracy. Its members represent different groups within Yemen." "US drone strike kills three in Yemen," http://america.aljazeera.com/articles/2013/7/30/us-drone-kills-alqaedasuspectsinyemen.html

[30] "Secret 'Kill List' Proves a Test of Obama's Principles and Will," *New York Times*, 29/05/2012: http://www.nytimes.com/2012/05/29/world/obamas-leadership-in-war-on-al-qaeda.html?pagewanted=all

[31] US Government Accountability Office, Report to the Ranking Member, Subcommittee on National Security, Homeland Defense, and Foreign Operations, Committee on Oversight and Government Reform, House of Representatives, "Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports", July 2012, http://dronewarsuk.files.wordpress.com/2012/09/us-gao-_-noproliferation-of-uavs.pdf

[32] ACLU, "European Parliament Members Speak Out Against U.S. Targeted Killing Program", 7 March 2013, https://www.aclu.org/blog/national-security/european-parliament-members-speak-out-against-us-targeted-killing-program.

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1. Nomenclature—Defining the Terms RPAS, UAV and "Drone"

A nomenclature has grown up between the UK military, the US designations, and the press. Drone is a general term from when, from 1917 to the 1950's, UAVs (unmanned aerial vehicles) were used as target practice for fighter pilots. They were black and were painted with yellow stripes for better visibility. The name "drone" has stuck ever since. UAV as a term has also stuck, due to its US origins and NATO usage, and is the second most common term in use after "drone". UAV's close relative, Remotely Piloted Aerial Systems (RPAS), avoids the gendered connotation of UAVs and also reflects the reality that many drone pilots are female.

The preferred nomenclature of HMG remains that articulated in MOD/DCDC Joint Doctrine Notes 3/10 and 2/11, namely that the following terms should be used:

> "An Unmanned Aircraft (UA) is defined as an aircraft that does not carry a human operator, is operated remotely using varying levels of automated functions, is normally recoverable, and can carry a lethal or non-lethal payload." Moreover, "An Unmanned Aircraft System (UAS) is defined as a system, whose components include the unmanned aircraft and all equipment, network and personnel necessary to control the unmanned aircraft."
>
> It should be stressed here that the thing which differentiates a UAV/UAS from cruise and ballistic missiles is that they are platforms from which missiles could be launched, rather than missiles themselves. In consequence, it should be noted that: "In the UK, cruise and ballistic missiles are not considered to be unmanned Aircraft."
>
> Remotely Piloted Aircraft (RPA) is no different in meaning to UA and the term which is also used, Remotely Piloted Air(craft) System, is also virtually the same, although phrased differently, as: "the sum of the components required to deliver the overall capability and includes the Pilot, Sensor Operators (if applicable), RPA, Ground Control Station, associated manpower and support systems, Satellite Communication links and Data Links."

It should be noted that it was also intended that, while discussing phrases like Unmanned Combat Aerial Vehicle (UCAV), it was intended that RPA be used instead, and this to be phased in over time. However, as the next section will show, the term UCAV is helpful in defining a rather useful difference, which RPA is not versatile enough to provide.

2. Current Utility and Dispersal—For what Purposes are RPAS used Currently?

Broadly, there are three ways to look at purpose. The first way is to look at what UAVs do in military contexts and the way that they are discussed. This is a more productive way of doing this than talking about whether a UAV is, say, a Class II or a MALE type and cuts across these quite effectively. The first grouping is to think of them as surveilling, flagging targets and striking, so Intelligence, Surveillance and Reconnaissance (ISR), then having Target Acquisition (ISTAR), then Predator and Reaper UCAVs.

ISR has been useful in Helmand, for instance in the North a year into the insurgency, when groups of insurgents were followed home and then could be arrested separately later, in preference to fighting in block houses.

On ISTAR, members of the committee will no doubt recall *The contribution of ISTAR to operations* (Eighth Report of Session 2009–10) and *The contribution of Unmanned Aerial Vehicles to ISTAR Capability* (Thirteenth Report of Session 2007–08). We would not seek to comment further on these at the current time but would like to re-iterate, as per paragraph 48 of the former: "There is the possibility that plans for the development of ISTAR capability might be put to one side or slowed during the process of the Strategic Defence Review, not just on account of financial constraints but because of the cross-Service nature of the capability. This should not be allowed to happen."

In terms of strategic functions, the second category, UAVs broadly operate in the following roles: Counter-Terrorism (CT), for example against Al Qaida and its offshoots like AQAP; Counter-Insurgency (COIN), for

instance against the Taliban in Afghanistan; and Operations, such as Libya. UAVs have been effective in all three. The role of ISTAR in Strike Warfare in Operations is also important to consider with regard to any deployments which may take place as per the NSS.

With regard to the third and final category, tactical uses have been areas where they have worked generally quite well, except for the odd crash or accident. Across all three strategic areas, UAVs have been highly successful in the decapitation and decimation of networks by targeted or signature strikes, aerial interdiction, area denial and the role of the UAV as a force multiplier has become the sort of function against which other militaries, insurgents and terrorists have yet to find an effective counter measure. However, in making this point, we recognise that there is a wider question to be answered as to the political consequences of such military uses on the wider battle for "hearts and minds" in the conflict, as well as the impact of these operations on the possibilities for achieving a peaceful settlement of the conflict. The latter question, and the relationship between the use of armed drones and any future peace processes, is currently the subject of a major research project being conducted by Professor Nicholas Wheeler, Professor David H. Dunn, and Professor Stefan Wolff in the Institute for Conflict, Cooperation, and Security (ICCS) at the University of Birmingham http://www.birmingham.ac.uk/research/activity/conflict-cooperation-security/Projects/ICCS-Projects.aspx

3. Lessons Learned from Operations in Afghanistan

UAVs in Afghanistan have been used in different circumstances to those in other places. This is primarily due to their use as part of a balanced force mix, for example with infantry, Special Forces and other aircraft. The contingent is also active in conjunction with Afghan National Army (ANA) and NATO allies. They are there at the invitation of the Afghan Government. The role of the UAVs in this case is to gather intelligence and attack Taliban and its allies in conjunction with troops on the ground. This provides a ground presence coupled with area denial, general interdiction and enhances the role of the UAV as a force multiplier. It should be noted that these remarks relate to the US and UK forces, as they have UCAVs. Naturally, ISR UAV practise by other ISAF forces, such as the Bundeswehr, stand.

In many respects, the lessons learned from Afghanistan have been comparatively easier to learn than those in, say, Pakistan, Yemen, and Somalia, due mainly to the fact that the above degree of interoperability does not obtain in these places. It is also inevitable that information and lessons from the other theatres are difficult to obtain. The lack of visibility and transparency is apparent from the current debates in the Pakistani context relating to the number of civilian casualties, which are highly contested, as well as the true state of opinion regarding UAV strikes in the Federally Administered Tribal Areas (FATA) from the people who live there.

Looking at functionality, operations on the ground have functioned well and co-operation between arms of service has been effective. The lives of allied forces have been saved and insurgent networks have been degraded through UAV activity.

There is some evidence to suggest that this has led to some Track 2 pourparlers with elements of the Taliban. That said, it is unclear how representative some of those on the other side of the table may be as well as whether network degradation has proceeded too quickly, so as to isolate cooler heads while elevating hotter ones. Given that CT strategy is primarily driven by "homeland security" concerns, whereas COIN reflects the more local context of occupation and state-building, it might be of interest to the Committee to consider the question of whether or not a CT strategy had been used against the Taliban when COIN might have been more appropriate under certain circumstances.

In either case, it remains to be seen what the effect of this will be, or indeed whether any gain will be forthcoming after 2014. With this in mind, we consider it unwise for the Committee to consider overly dramatic cuts to this area following withdrawal as it seems clear that there will need to be some capacity left in the field at that point.

With regard to legal questions, there have been a number of civilian deaths which have had nothing to do with the insurgency and for which British forces have behaved honourably in their dealings with bereaved family members in accordance with customary norms. This, then, while compared to other areas of UAV use, like Pakistan, Yemen and Somalia, presents a much more clear-cut Law of Armed Conflict/International Humanitarian Law (LOAC/IHL) scenario than the others and we intend to return to this under heading 6).

4. Tomorrow's Potential—What Additional Capabilities will the UK Seek to Develop from now to 2020?

Broadly, we see ten interlinked themes coming to the fore under six headings. These are: Speed and Stealth; High Altitude Long Endurance (HALE); Enhanced ISTAR and UCAV functionality; Swarm Technology; Autonomy; and Strong counter intelligence and co-operation with allies and UAV resilience. Brief treatment of these is below:

> Speed and Stealth—Will the UK buy Northrop-Grumman's X47B, assuming it enters service in the US in 2019? The X47B is subsonic (Mach 0.9) but supersonic UAVs will be in the process of being developed by that time. The speed of change will be quite rapid and it will be necessary to adapt quickly.

High Altitude Long Endurance (HALE)—The QinetiQ Zephyr HALE UAV, which can remain in the air for at least three months, will be representative of a pattern for development of craft which by then will remain aloft for longer and will have enhanced ISR capabilities. It will be important to remain a leading nation in the development of this technology.

Enhanced ISTAR and UCAV functionality—The Thales Watchkeeper WK450 may also have a UCAV role by 2020. If not, there will always be a successor to the MQ9. And the UK will have to consider which weapons systems represent value for money as off the shelf purchases and which offer the best opportunities for interoperability with allies.

Swarm Technology—This is a key area for the armed forces as both an ISR mechanism and a dual use one, so the same technology which, say, helps find survivors after earthquakes could also help the armed forces conduct operations in heavily built up areas.

Potential extremely limited autonomy—The Year 2020 will represent the end of Epoch 2, when extremely limited autonomy is supposed to be ready (it is acknowledged that it will be end of Epoch 2 and beginning of Epoch 3). Both to 2020 and over a longer period, up to and including Epoch 6, there will be considerable developments and difficulties in the field of autonomy, especially over developing a system over which the responsible politician could have full confidence that it will do what it is expected to do. There would need to be both true understanding and transparency here. There will be naysayers but the key policy would include human overrides and the centrality of a human operator in or on the loop.

Strong counter intelligence and co-operation with allies—There has been a significant attempt by several powers to acquire technology of this kind by espionage. The UK should ensure that every step is taken to ensure that this is not successful. Partnerships with other nations, like the US and Israel, on UAV activities should continue and the UK should ensure counter-espionage measures are in place. Associated with this should be an attempt to understand, and where necessary to control, proliferation via commercial, civilian developments, and dual-use technology.

With regard to UAV resilience, it is important to ensure UAVs are more resilient to counter measures (for instance, being shot down, being jammed or spoofed, or UAVs fighting UAVs). This would naturally link in with questions about espionage and proliferation. This resilience includes developing the UK's own counter-UAV capabilities to respond to their use against the UK by adversaries in theatre or at home.

5. Constraints on the use of RPAS in the UK and Overseas

Broadly, and in addition to the point on UAV resilience above, we see five main constraints to operating in the UK and overseas. None are insuperable but all are considerations requiring careful thought.

It does not seem, in the current climate, possible to use UCAVS in a CT role in the UK unless the most extreme circumstances prevailed. However, they could be used for that reason overseas.

Sense and avoid technology would need to be shown to work well and be applied to all UAVs operating in British airspace, as well as internationally. One accident would put the use of UAVs, even those being used for benign and potentially life-saving functions, back years so it is important to ensure that the airways are safe.

Privacy is a factor which any UK Government would need to consider in the deployment of any ISR system. Legal measures for their use and any data collected would need to be in force. There will also be advocacy groups which will make their views known and there will be a lively public debate in consequence. Different countries see this differently, so there might be situations where decisions taken by one court would not necessarily travel elsewhere.

The role of public opinion in such a debate could provide one of the strongest impediments to the use of UAVs in the round. It may take time for the public to accept them and many people will not be confident in their utility. This will be so much more the case when a measure of autonomy is added, which takes us to the fifth point.

Autonomy here is distinct from a system which is fully automated. This is a distinction which should be kept, as misunderstandings and loose language on this issue do more harm than good in the general debate. There will, naturally, need to be legal safeguards in place to ensure responsibility is assigned and this may do something to the debate and the role of public opinion in it.

6. Ethical and Legal Issues Arising from the use of RPAS

As mentioned above, at question 3), the LOAC/IHL dimensions have been tolerably clear in Afghanistan as a battlespace, and this is the only place the UK operates UCAVs.

That said, IHL remains a highly indeterminate legal space, and the debate over the legality of the use of armed drones in specific situations will inevitably continue to generate interpretive controversies over the application of IHL, focusing on the question of how to balance civilian protection against the exigencies of military requirements, and what types of activity deny individuals their legal protection as civilians. UN Special Rapporteurs Christof Heyns and Ben Emmerson have highlighted the importance of this question in their two recent UN reports, with both calling for increased transparency on targeting criteria and civilian casualties. We

would support the need for greater transparency on civilian casualties, so as to give publics the opportunity to debate and deliberate these questions, and hold political and military decision-makers and officials accountable for their decisions, but appreciate that any disclosure of UK and US targeting criteria has to be balanced against the need to maintain the element of surprise against insurgent and terrorist forces.

Operations in Pakistan and Yemen are considered different to Afghanistan and this is where International Human Rights Law (IHRL) would be the more appropriate legal frame to employ, at least most of the time, though LOAC/IHL could apply there, too, depending on circumstances.

The killing of Anwar al-Awlaqi would have been almost impossible for a European country to carry out, but the US has the dual safeguard of the Authorisation of the use of Military Force (AUMF) and presidential authority, which can and does deny judicial review. These do not apply to the UK.

The UK also has occasionally to face claims that intelligence gathered by its UAVs (though situations applying to HUMINT and SIGINT may also occur) might have been given to an ally like the US, which then killed an individual believing them to be a terrorist or insurgent. Where there have been civilian casualties, there may or may not be a legal case to answer.

The final legal point to consider is the role of UAVs in humanitarian emergencies. To date, their use has been confined to ISR functions. Given the Responsibility to Protect (R2P), it may be the case that UN UCAVs could have to be deployed at some point in the future, for example from ISR, as currently deployed in the DRC, to ISTAR and to UCAVs. Were this to happen, it could create interesting legal precedents.

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