

Modern Warfare: The Introduction of Predator Drones

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JOSEPH MORBI, DEC 5 2011

Predator drones have had a huge impact on modern warfare, particularly during the Global War on Terror, as they have been able to provide surveillance and combat capabilities for a relatively low cost and without risk to the human operator. The technology is relatively new, with the first Predator drone being developed in 1995, and already it has quickly evolved and developed into a whole range of unmanned aerial vehicles with different strengths all operating under the blanket of 'Predator drones'. Their uses range from surveillance (RQ-1 Predator); to close air support (MQ-1C Grey Eagle); to the role of hunter-killer (RQ-9 Reaper), and the technology is still advancing with the newest addition (the Avenger) set utilise stealth technology such as an electro-optical targeting system (EOTS) which will reduce the aircraft's radar signature.[1] In this essay I will explore the implications that Predator drones have for modern warfare, looking at both the possibilities they present for the user such as the decreased risk to the pilot, and the drawbacks they have had and may continue to have such as unsecured communications links which leave them vulnerable to hacking and the ease in which civilian casualties are being caused; through which I will determine the likely short-term future at least of drone warfare.

Predator drones can operate in a vast range of environments and fulfil many roles such as reconnaissance and intelligence gathering; close air support for ground forces; offensive aerial operations; and hunter-killer operations. The Predator drone was first introduced in 1995 and underwent field testing in Bosnia, proving to be capable of outperforming any human pilot due to its 50-hour endurance, as well as providing a relatively inexpensive alternative to piloted aircraft.[2] The Predator at this time became known as the RQ-1, the prefix 'R' meaning 'reconnaissance' and the prefix 'Q' denoting that the aircraft is a 'drone'. [3] The advent of unmanned aerial vehicles from this point onwards has been extremely valuable as they can provide near real-time reconnaissance for both commanders in the field and decision-makers potentially thousands of miles away, and crucially can continue to provide the information for a much longer period of time than was previously possible due to human constraints, although this arguably encourages micro-management by civilian personnel and subsequent interference in military and intelligence processes.[4] As it does not have to carry a pilot and the necessary life support systems it also has more space for extra equipment which allows it to produce more detailed images, as well as allowing the aircraft to be built to smaller dimensions, making it harder to detect than manned aircraft that are not equipped with stealth technology. Originally the Predator was designed only for reconnaissance missions, gathering intelligence which could then be acted upon by human operators, by which time the opportunity to act may have passed. One example of this is in Afghanistan throughout 2000 and 2001 "Predators operated by the CIA sighted Osama bin Laden many times," but due to the aircraft being unarmed or "toothless" the operators were unable to act immediately on what they saw and bin Laden disappeared.[5]

Since 2001 as a reaction to this time-lapse Predators have been adapted to carry and deploy ordnance, including AGM-114 (air-to-ground) Hellfire and AIM-92 Stinger (air-to-air) missiles, allowing them to become "multimission aircraft and were redesignated as MQ-1s" with the 'M' prefix denoting 'multimission'. [6] The Predator RQ-1/MQ-1 is still however regarded as a reconnaissance aircraft rather than a combat aircraft with only a minor strike capacity, sacrificing speed and armament for virtual silence and long flight endurance, but this has opened new windows for UAV technology to access. This shift has undoubtedly allowed UAVs to take on new roles, giving them the capacity to identify a target and strike it immediately, reducing the need to wait for other vehicles operationally designed for the task and reducing the risk of the loss of human life in high-risk missions. The Predator itself has gone through a number of development stages during its relatively short life and has been developed into various other UAVs such

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as the MQ-1C Grey Eagle and the MQ-9 Reaper. The MQ-9 Reaper, originally known as Predator B, is a far more 'multimission' capable drone that is regarded as a true combat aircraft designed specifically to destroy ground targets and has helped expand the role of the UAV from a primarily intelligence gathering framework to "a true hunter-killer role with the Reaper."^[7] The MQ-9 Reaper is significantly more combat-designed than the MQ-1 Predator, sacrificing the long flight endurance of the MQ-1 for dramatically increased speed and a much higher payload, carrying up to 14 Hellfire missiles compared to the two carried by the MQ-1.^[8] The technology is still improving however and the producer of the Predator and Reaper, General Atomics, is currently developing the next drone aircraft which will be known as the Avenger (Predator C). The Avenger will differ from the previous drones as it will be an Unmanned Combat Aerial Vehicle (UCAV) as opposed to a reconnaissance UAV meaning that it will likely fulfil the role of a dedicated stealth fighter/bomber, although it is still expected to utilise many of the advantages of UAV technology such as longer flight endurance as well as incorporating stealth technology such as internal weapons bays, showing a clear advantage over existing manned aircraft of the same type.^[9] The Predator drone has been under constant redevelopment during its relatively short history, and each development stage has brought new implications to modern warfare beginning with ordinary surveillance without the risk of human life for a longer period of time, before taking advantage of the extra space from not having a pilot for more advanced recording equipment; multiple types of camera; larger data banks for longer recording sessions; and now external and (with the Avenger) internal weapons bays. Predator Drones are taking an ever increasing part in air combat largely due to their relatively small cost and the lack of risk to a human pilot's life.

Predator Drones are seemingly becoming the weapon of choice, particularly in the Global War on Terror, with their ability to find and identify targets quickly without being noticed before launching missiles accurately to eliminate those targets. In the first two months of operations in Afghanistan alone some 525 targets were laser-designated by Predators for other aircraft to strike, whilst in the first year 115 targets were located and destroyed by Predators on their own, leading to Tommy Franks (the commander of all US forces in the region at the time) to declare that the Predator "is my most capable sensor in hunting down and killing Al Qaeda and Taliban leadership and is proving critical to our fight."^[10] The RQ-1/MQ-1 Predator has achieved much success as both a reconnaissance and strike aircraft in the Global War on Terror and has been involved in a number of theatres including Afghanistan, Pakistan and Yemen, collecting intelligence and eliminating certain targets. The MQ-1C Grey Eagle has expanded this role since its introduction in 2009 and was the aircraft chosen to form Task Force ODIN (Observe Detect Identify Neutralize), carrying a slightly heavier payload than the MQ-1 Predator, which allows it to provide close air support to ground forces. Task Force ODIN was created as a reaction to the wars in Afghanistan and Iraq as army officers complained that "the Air Force has often been out of touch, fulfilling only half of their requests for the sophisticated surveillance aircraft that ground commanders say are needed to find roadside bombs and track down insurgents", and as a result the Army decided to create Task Force ODIN to provide surveillance and close air support capability independently from the Air Force.^[11] The newer, more powerful MQ-9 Reaper drones have also enjoyed success in the Global War on Terror, providing a faster and much more heavily armed strike package than the MQ-1 Predator which has allowed it to take on a hunter-killer role, searching for numerous targets and destroying them rather than striking one target and returning to base to rearm.^[12] Predator Drones have received special importance in the War on Terror as they provide a much cheaper and faster way of searching for key members of terrorist organisations in hideouts that could otherwise prove very difficult to find, and have proven to be very effective at targeting key al-Qaeda leaders on numerous occasions, one such instance being the killing of Usama al-Kini, the then-head of al-Qaeda in Pakistan and his deputy Sheikh Ahmed Salim Swedan in January 2009 "at their hideout in the South Waziristan tribal region of Pakistan."^[13] The drones were able to identify their targets quickly and eliminate them before they had time to escape, a mission that would have been difficult to undertake before the advent of current UAV technology, and certainly acted far more quickly and effectively than a ground operation could have hoped to.

The tactics used in the Global War on Terror have been dramatically influenced by Predator Drones as they provide new solutions to the ever-shifting nature of the battlefield. One of the most important advantages that the Predator Drone has over other aircraft is the amount of noise it emits whilst flying. The engines used by the drones are designed to be much quieter than traditional aircraft, allowing them to fly lower without being noticed, their smaller size and slimmer frame also contributing to this. This is particularly true of the RQ-1/MQ-1 Predator which sacrifices speed for virtual silence, allowing it to follow targets for long periods of time without being noticed by anyone, before either striking the target or relaying information on positions to better equipped aircraft such as the faster and more

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heavily armed MQ-9 Reaper. A typical example of this has been set out by Michael and Gladys Green in which “enemy soldiers meet at a small fort in the mountains” to discuss an attack, unaware that a Predator Drone is “quietly flying above them”.^[14] The Predator then follows the commander after the meeting to his command post and fires a missile, destroying it and killing the commander, at which point the drone heads back to base.^[15] Another particularly useful asset for Predator drones is their ability to remain airborne significantly longer than any human pilot, with the MQ-1 Predator having a flight endurance of approximately 40 hours, whereas a manned aircraft such as the F-16 Fighting Falcon is constrained by both fuel levels and human endurance and can therefore never achieve a similar operational timeframe.^[16] The MQ-9 Reaper with its heavier payload cannot quite match the flight endurance of the lighter MQ-1 Predator but it can still outstrip any similarly armed manned aircraft as it can remain airborne for 14 hours when fully loaded.^[17] This extended flight time allows for not only uninterrupted surveillance over a longer period of time, but also enables operators to track targets moving from one place to another, identifying multiple enemy positions that can then be eliminated with ease. Predator drones have massive implications for modern warfare as they can offer relatively light force with heavy firepower as well as quick access to a wealth of intelligence that can then be acted upon immediately. The Global War on Terror has shown how effective these aircraft can be at eliminating multiple threats at not only a much cheaper financial cost, but also at no risk to the human operator, a major implication for modern warfare that could set a precedent for future war strategies.

With this new emphasis on UAVs due to their relative low-cost (compared to manned aircraft), and the elimination of the human risk there has been a perhaps understandable transition in favour of entire drone squadrons, a move that has already been seen with the conversion of the 174th Fighter Wing from the manned F-16 Fighting Falcon to the unmanned MQ-9 Reaper drone.^[18] Political and military elites have spent a lot of time searching for ways to reduce casualty figures for their side whilst still keeping the same operational capabilities they have at the time. Perhaps the most logical path to take is the use of robotics in warfare, replacing the human operators in the field with replaceable but deadly drones. The operators meanwhile can be kept completely safe from the enemy, often being located in a different country as is the case with Predator drones, as most of the pilots operate the aircraft from air force bases in Nevada.^[19] One of the principle advantages of the UAV is that it can be used in what would have been a high risk situation with no fear of suffering human casualties, and even if the drone is shot down or malfunctions, its relatively low cost allows for much easier replacement than a manned aircraft. As an example of this in 1995 in Bosnia a Predator drone was shot down in “the same area where US Air Force Captain Scott O’Grady was downed two months earlier”, but as an unmanned vehicle there were no casualties when it was shot down and perhaps critically it could not be interrogated, and it did not provoke a major media incident at home as a dead or captured pilot would have.^[20] The argument for UAVs, for which Predator drones provide the flagpole, notes that modern warfare is part of the political system with political implications. It realises that “Casualty aversion is a big issue in Washington, and...The American people are coming to expect that military operations are casualty free.”^[21] Drones are by far the most efficient, cost-effective casualty reduction strategy at the present time, offering devastating capabilities whilst reducing the risk to human pilots. They also however have the capacity to reduce ground force casualties as they can provide prolonged Close Air Support and, particularly with the MQ-9 Reaper’s high payload, can potentially remove the need for any ground forces to be present in certain situations.

Although drones may have the potential to revolutionise modern warfare in the near future, there are certain problems with the technology itself that need to be addressed, and perhaps even future dangers that need to be avoided in order to maintain an armed forces’ effectiveness. The first is the issue of civilian casualties, which are perhaps unavoidable in modern warfare as it is no longer separated from the social landscape, however the ease in which they can be caused due to the ‘digital divide’ between the pilot in Nevada and the plane in Afghanistan or Pakistan is alarming. To take just one example of many, on 13th January 2006 a computer operator gave a command to a Predator drone “twelve and-a-half time zones away to shoot four Hellfire missiles at three houses in Demadola, Pakistan” with the intention of killing Ayman al-Zawahiri (a prominent leader of al-Qaeda) and destroyed the houses of three jewellers, killing twenty-two civilians celebrating the Muslim holiday of Eid al-Adha.^[22] The next big issue is that Predator drones, particularly the unarmed RQ-1 or the lightly armed MQ-1 which are both also relatively slow, are much more vulnerable to being shot down due to their lower flight altitude and it has been suggested by Air Force officials that more than a third of their Predators have crashed during the Global War on Terror.^[23] Apart from those shot down by enemy forces, many Predators have suffered malfunctions that have caused them to crash, and although some of these may be put down to pilots struggling to use the controls, some have caused real concern over

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the reliability of the systems. One particular example of this is the crash of a Global Hawk, a UAV used alongside the Predator systems, in July 2002 which caused the United States Air Force to ground all their remaining Global Hawks until the cause was verified.[24] Whilst the loss of a single Predator is much easier to bear than a manned aircraft both financially and in terms of the human cost, the crash rate is “100 Predators to one piloted USAF aircraft”, which would suggest that perhaps cumulatively there is a higher financial cost than before.[25]

Another issue related to the drones crashing is the sensitive nature of the technology on-board. When one of the British-controlled MQ-9 Reaper drones crashed in Afghanistan, “a British special forces team was sent in to recover key items before the wreckage was blown up to prevent it falling into the hands of the enemy”, as access to certain technology could aid the enemy in discovering how to counter the UAV threat.[26] Particularly problematic is the potential for the enemy to hack into a UAV’s technology systems, providing information that they can then act upon. This has been known to happen in Iraq as insurgents used cheap software such as SkyGrabber, which is publicly available for \$26, to hack recording equipment on Predator Drones which then gave them the opportunity to “evade or monitor U.S. military operations.”[27] The reason this was possible was simply because the video feeds were not encrypted and the communications link was unprotected, and although the lapse in security did not result in the insurgents taking control of the drones, there is the possibility that with more sophisticated software this would have been possible.[28] The advent of Predator drones and other UAVs may perhaps present another problem for armed forces that use them: over-dependency. As states (particularly perhaps the US) increase spending on technological advances such as Predator drones they increase their dependency on them, and if it were possible to take out the necessary communication or satellite links, it could potentially paralyse a nations’ armed forces in a particular theatre. In a statement to the United States subcommittee on Terrorism, Technology and Homeland Security, it was mentioned that “Russian and Chinese military scientists in open source writings describe the basic principles of ‘Super-EMP’ weapons...[which] can destroy even the best protected U.S. military and civilian electronic systems.”[29] The technology used in Predator drones is not perfect and requires further improvement, perhaps particularly in terms of reliability and security, but the implications of over-dependency on what is still flawed technology could be disastrous in the event of a major war if it proves possible for an enemy to disable those systems altogether.

Predator drones have certainly begun to influence US strategy, particularly in the Global War on Terror as they offer new solutions to problems that the US armed forces have in the past struggled to overcome, such as how to conduct a counter-insurgency campaign. They have proven useful in gathering sustained surveillance, with the RQ-1 Predator being able to fly 40 hour missions, a feat that would have been impossible in a manned aircraft due to “the physiological limits of the human operator.”[30] They have also demonstrated a wide range of combat abilities, and have begun an integration as part of a Combined Arms approach with Task Force ODIN, providing close air support from MQ-1C Grey Eagles to ground forces as needed.[31] The technology may also prove useful as a tool of modern gunboat diplomacy, allowing for the containment of possible future threats and securing technical superiority.[32] There are both positive and negative implications for the applications of Predator drones. On the positive side the elimination of risk to the human operator and the relatively low cost have allowed for a realistic casualty aversion strategy, as well as easing the financial burden on a country, and the high output that Predator drones can still give may perhaps allow for lighter force structures elsewhere. On the other side of the argument, the increased dependency on technology could potentially prove disastrous, whilst the frequency in which civilians have been mistakenly killed is certainly an issue that needs addressing somehow. It seems likely that Predator drones will continue to operate and indeed increase in their capacity, at least in the short-term, however the consequences of this are still unknown.

Bibliography

‘Stealthy F-35 Sensor To Fly On Avenger UAV’ *Aviation Week*
http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/AVENGER091809.xml
(accessed 30th April 2011)

Major Nolan, R II. ‘The Pilotless Air Force? A Look at Replacing Human Operators with Advanced Technology’ *Air Command and Staff College: Research Department* (March 1997)

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Yenne, B. *Attack of the Drones: A History of Unmanned Aerial Combat* (Zenith Imprint, 2004)

Dr Haulman, D. 'U.S. Unmanned Aerial Vehicles in Combat, 1991-2003' *Air Force Historical Research Agency* (June 2003)

Singer, P. *Wired For War: The Robotics Revolution and Conflict in the 21st Century* (New York, Penguin Group, 2010)

'MQ-9 Reaper (Predator B)' *GlobalSecurity.org* <http://www.globalsecurity.org/military/systems/aircraft/mq-9.htm> (accessed 28th April 2011)

'MQ-9 Reaper Hunter/Killer UAV' *Defense Update* <http://www.defense-update.com/products/p/predatorB.htm> (accessed 29th April 2011)

'Predator C Avenger Makes First Flights' *Aviation Week* http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/aw042009p1.xml (accessed 29th April 2011)

'At Odds With Air Force, Army Adds Its Own Aviation Unit' *New York Times* <http://www.nytimes.com/2008/06/22/washington/22military.html?partner=rssnyt&emc=rss> (accessed 30th April 2011)

'Air Force's hunter-killer UAV now flying in Afghanistan' *U.S. Air Force* <http://www.af.mil/news/story.asp?id=123071527> (accessed 28th April 2011)

'Predator attack kills al-Qaeda leaders' *The Times Online* <http://www.timesonline.co.uk/tol/news/world/asia/article5484941.ece> (accessed 28th April 2011)

Green, M & Green, G. *Remotely Piloted Aircraft: The Predators* (Minnesota, Capstone Press, 2004)

'Predator' *General Atomics Aeronautical* <http://www.ga-asi.com/products/aircraft/predator.php> (accessed 29th April 2011)

'Warplanes: The Rise of the Droids' *Strategy Page* <http://www.strategypage.com/htm/w/htairfo/articles/20080811.aspx> (accessed 28th April 2011)

Major Matsushima, M. 'Unmanned Combat Aerial Vehicles: Transformation of the USAF' *School of Advanced Warfighting* (May 2001)

Simons, G. 'Drone Diplomacy' *The Link* Vol. 44 Issue 2 (Americans for Middle East Understanding, Inc. April-May 2011)

'Drones Are Weapons of Choice in Fighting Qaeda' *New York Times* <http://www.nytimes.com/2009/03/17/business/17uav.html> (accessed 30th April 2011)

Cordesman, A. *The Lessons of Afghanistan: war fighting, intelligence, and force transformation* (Center for Strategic and Intelligence Studies, 2002)

Lawless, W. 'A quantum approach to multi-agent systems (MAS), organizations, and control' *The Command and Control Research Program* http://www.dodccrp.org/events/8th_ICCRTS/pdf/094.pdf (accessed 30th April 2011)

'How UK fights remote control war' *BBC News* <http://news.bbc.co.uk/1/hi/uk/7439825.stm> (accessed 30th April 2011)

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'Insurgents Hack U.S. Drones' *The Wall Street Journal* <http://online.wsj.com/article/SB126102247889095011.html> (accessed 30th April 2011)

'Iraq insurgents 'hack into video feeds from US drones'' *BBC News* http://news.bbc.co.uk/1/hi/world/middle_east/8419147.stm (accessed 30th April 2011)

Foreign Views of Electromagnetic Pulse (EMP) Attack Statement by Dr Pry, P; EMP Commission Staff, before the United States Senate Subcommittee on Terrorism, Technology and Homeland Security 8th March, 2005

'Task Force ODIN IV' *GlobalSecurity.org* <http://www.globalsecurity.org/military/agency/army/tf-odin.htm> (accessed 30th April 2011)

[1] 'Stealthy F-35 Sensor To Fly On Avenger UAV' *Aviation Week* http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/AVENGER091809.xml (accessed 30th April 2011)

[2] Major Nolan, R II. 'The Pilotless Air Force? A Look at Replacing Human Operators with Advanced Technology' *Air Command and Staff College: Research Department* (March 1997) Pg. 11

[3] Yenne, B. *Attack of the Drones: A History of Unmanned Aerial Combat* (Zenith Imprint, 2004) Pg. 60

[4] Dr Haulman, D. 'U.S. Unmanned Aerial Vehicles in Combat, 1991-2003' *Air Force Historical Research Agency* (June 2003) Pg. 2-4

[5] Singer, P. *Wired For War: The Robotics Revolution and Conflict in the 21st Century* (New York, Penguin Group, 2010) Pg. 34

[6] Yenne, B. *Attack of the Drones: A History of Unmanned Aerial Combat* (Zenith Imprint, 2004) Pg. 60

[7] 'MQ-9 Reaper (Predator B)' *GlobalSecurity.org* <http://www.globalsecurity.org/military/systems/aircraft/mq-9.htm> (accessed 28th April 2011)

[8] 'MQ-9 Reaper Hunter/Killer UAV' *Defense Update* <http://www.defense-update.com/products/p/predatorB.htm> (accessed 29th April 2011)

[9] 'Predator C Avenger Makes First Flights' *Aviation Week* http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/aw042009p1.xml (accessed 29th April 2011)

[10] Singer, P. *Wired For War: The Robotics Revolution and Conflict in the 21st Century* (New York, Penguin Group, 2010) Pg. 34-35

[11] 'At Odds With Air Force, Army Adds Its Own Aviation Unit' *New York Times* <http://www.nytimes.com/2008/06/22/washington/22military.html?partner=rssnyt&emc=rss> (accessed 30th April 2011)

[12] 'Air Force's hunter-killer UAV now flying in Afghanistan' *U.S. Air Force* <http://www.af.mil/news/story.asp?id=123071527> (accessed 28th April 2011)

[13] 'Predator attack kills al-Qaeda leaders' *The Times Online* <http://www.timesonline.co.uk/tol/news/world/asia/article5484941.ece> (accessed 28th April 2011)

[14] Green, M & Green, G. *Remotely Piloted Aircraft: The Predators* (Minnesota, Capstone Press, 2004) Pg. 4

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Written by Joseph Morbi

- [15] Green, M & Green, G. *Remotely Piloted Aircraft: The Predators* (Minnesota, Capstone Press, 2004) Pg. 6
- [16] 'Predator' *General Atomics Aeronautical* <http://www.ga-asi.com/products/aircraft/predator.php> (accessed 29th April 2011)
- [17] 'MQ-9 Reaper Hunter/Killer UAV' *Defense Update* <http://www.defense-update.com/products/p/predatorB.htm> (accessed 29th April 2011)
- [18] 'Warplanes: The Rise of the Droids' *Strategy Page* <http://www.strategypage.com/htm/w/htairfo/articles/20080811.aspx> (accessed 28th April 2011)
- [19] Singer, P. *Wired For War: The Robotics Revolution and Conflict in the 21st Century* (New York, Penguin Group, 2010) Pg. 32
- [20] Major Nolan, R II. 'The Pilotless Air Force? A Look at Replacing Human Operators with Advanced Technology' *Air Command and Staff College: Research Department* (March 1997) Pg. 6
- [21] Major Matsushima, M. 'Unmanned Combat Aerial Vehicles: Transformation of the USAF' *School of Advanced Warfighting* (May 2001) Pg. 2
- [22] Simons, G. 'Drone Diplomacy' *The Link* Vol. 44 Issue 2 (Americans for Middle East Understanding, Inc. April-May 2011) Pg. 6
- [23] 'Drones Are Weapons of Choice in Fighting Qaeda' *New York Times* <http://www.nytimes.com/2009/03/17/business/17uav.html> (accessed 30th April 2011)
- [24] Cordesman, A. *The Lessons of Afghanistan: war fighting, intelligence, and force transformation* (Center for Strategic and Intelligence Studies, 2002) Pg. 104
- [25] Lawless, W. 'A quantum approach to multi-agent systems (MAS), organizations, and control' *The Command and Control Research Program* http://www.dodccrp.org/events/8th_ICCRTS/pdf/094.pdf (accessed 30th April 2011)
- [26] 'How UK fights remote control war' *BBC News* <http://news.bbc.co.uk/1/hi/uk/7439825.stm> (accessed 30th April 2011)
- [27] 'Insurgents Hack U.S. Drones' *The Wall Street Journal* <http://online.wsj.com/article/SB126102247889095011.html> (accessed 30th April 2011)
- [28] 'Iraq insurgents 'hack into video feeds from US drones'' *BBC News* http://news.bbc.co.uk/1/hi/world/middle_east/8419147.stm (accessed 30th April 2011)
- [29] *Foreign Views of Electromagnetic Pulse (EMP) Attack* Statement by Dr Pry, P; EMP Commission Staff, before the United States Senate Subcommittee on Terrorism, Technology and Homeland Security 8th March, 2005
- [30] Major Nolan, R II. 'The Pilotless Air Force? A Look at Replacing Human Operators with Advanced Technology' *Air Command and Staff College: Research Department* (March 1997) Pg. v
- [31] 'Task Force ODIN IV' *GlobalSecurity.org* <http://www.globalsecurity.org/military/agency/army/tf-odin.htm> (accessed 30th April 2011)
- [32] Simons, G. 'Drone Diplomacy' *The Link* Vol. 44 Issue 2 (Americans for Middle East Understanding, Inc. April-May 2011) Pg. 3

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