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COUNTERING THE AFGHAN INSURGENCY:
LOW-TECH THREATS, HIGH-TECH SOLUTIONS

SPECIAL REPORT

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I. INTRODUCTION

1. With a total strength of over 132,000 troops and 48 troop-contributing nations, the International Security Assistance Force (ISAF) in Afghanistan is NATO's most important current operation. ISAF's mission is three-legged: to reduce the capability and will of the insurgency, to support the growth in capacity and capability of the Afghan National Security Forces (ANSF) and to facilitate improvements in governance and socio-economic development in order to provide a secure environment for sustainable stability that is observable to the population. The first and more traditional military task of countering the insurgency is at the heart of this report.

2. As in any military campaign, a multitude of challenges have to be overcome. One of the biggest challenges is the threat from Improvised Explosive Devices (IEDs). It is the number one cause of casualties for both ISAF and ANSF troops and for civilians. Beyond the casualties, the IED campaign, conducted by the insurgency in large swathes of the country, has had a major psychological impact on ISAF and ANSF troops, Afghan civilians and on the perceptions of the populations of NATO member states and partner countries. IEDs, often made for a handful of dollars, pose a major low-tech threat to ISAF military operations and the wider counter-insurgency effort, thereby possibly undermining NATO's overall goals in Afghanistan.

3. Unsurprisingly, many resources have been devoted to defeating the IED threat over the years. The US Joint IED Defeat Organization (JIEDDO) alone has an annual budget of over USD 3 billion, having spent an estimated USD 20 billion since its establishment in 2006 on Counter-IED efforts (C-IED).¹ Although no single technological breakthrough will provide a 'silver bullet' against IEDs, technological efforts are nevertheless crucial to overcoming the threat. Most importantly perhaps, unmanned systems are increasingly used to counter the IED threat in Afghanistan. Unmanned aerial vehicles (UAVs), often called drones, patrol the skies, and unmanned ground vehicles (UGVs) scour the earth for IEDs.

4. However, UAVs and UGVs are not only a high-tech weapon in the fight against IEDs, but also represent solutions to other problems on the battlefield. UAVs are by now deeply integrated into deployed combat units, for Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) or used as capable strike assets in their own right. Meanwhile, UGVs are useful for locating, identifying and disarming IEDs in the field, but they are only slowly making an impact on other battlefield tasks, such as patrolling and logistics.

5. This report outlines the threat of IEDs to ANSF and ISAF troops as well as to Afghan civilians. It also highlights the countermeasures taken to negate them and investigates the role of UAVs and UGVs in the wider efforts to disrupt and defeat the insurgency against the Afghan government. In addition, the report discusses an issue that is not part of the ISAF mission, but is closely linked to it: the covert and controversial US drone campaign in Pakistan, whereby UAVs, under the command of the CIA, target suspected militants that take part in or aid the insurgency in Afghanistan. With US-Pakistan relations at a new low following the raid on Osama bin Laden's compound by US Special Forces in Abbottabad on 2 May 2011, this issue has become ever more salient.

6. The report has been prepared for the Science and Technology Committee (STC) as its 2011 Special Report for the NATO PA Annual Session in Bucharest, Romania. As it addresses both the low- and high-tech challenges and solutions to key objectives of the Alliance and its partner countries, it contributes to this year's NATO PA focus on the mission in Afghanistan. In this way, it will inform the debate of members of the STC, and the NATO PA as a whole, on the technological aspects of the counter-insurgency campaign in Afghanistan. It will also allow the members to feed

¹ Rowan Scarborough, "Congressman Lauds Tactic to Snuff IEDs in War Zones," *The Washington Times*, 17 September 2010; and Craig Whitlock, "IED Casualties in Afghanistan Spike," *The Washington Post*, 26 January 2011.

these discussions back into their own national debates. The report has been updated throughout the year to reflect ongoing developments and input from Assembly members at the Spring Session in Varna, Bulgaria.

II. THE THREAT FROM IMPROVISED EXPLOSIVE DEVICES IN AFGHANISTAN

7. IEDs are by far the most significant cause of ISAF and ANSF casualties in Afghanistan. The US Department of Defense defines an IED as a “device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract.”² While IEDs might contain military parts, they are normally constructed from non-military components. The term IED was originally developed by the British military in the 1970s, in response to the widespread use of homemade bombs consisting of agricultural fertilisers and plastic explosives by the Irish Republican Army. However, it first came to global prominence in the Iraq war of 2003-2010, when the widespread and lethal use of IEDs by various terrorist and insurgent groups became so prevalent that it represented a ‘strategic surprise’ to military forces operating in the country, requiring a major reorientation of strategy, operations and resources.³

8. Over the last three years, about 60 per cent of NATO casualties in Afghanistan have been caused by IEDs.⁴ Between 2008 and 2010, IED events in Afghanistan increased by over 300 per cent.⁵ Since international operations in Afghanistan began, over 1,000 troops have been killed by IEDs.⁶ In 2010 alone, 268 American troops were killed by IED strikes, a 60 per cent increase compared with the year before, and 3,360 American troops were wounded - almost a threefold increase.⁷ Coalition-wide, in 2010, there were about 7,800 casualties from IEDs and 368 fatalities.⁸ However, ISAF officials have pointed out that the numbers of personnel killed in action as well as of those seriously wounded in action are trending downwards – except for the category of ‘lightly wounded’, which is steadily increasing. Given the fact that primitive IED factories can produce an IED approximately every 15 minutes⁹, the IED phenomenon and greater C-IED knowledge-sharing and co-operation must clearly remain a high priority for NATO member states and partners. This section of the report, therefore, looks at the rationale behind their use, how they work, IED trends and developments, as well as possible solutions.

A. THE RATIONALE BEHIND THE USE OF IMPROVISED EXPLOSIVE DEVICES

9. In military terms, most IEDs, whether lethal or not, achieve a so-called ‘block’ function, whereby insurgents try to deny ISAF or ANSF troops access to key areas or prevent them from advancing in certain directions. In this way, IEDs disrupt and slow manoeuvre and momentum in counter-insurgency operations at the local level, which can, ultimately, have a strategic effect. IEDs often invalidate conventional military tactics, such as the fire and manoeuvre tactics of troops in contact. IEDs are often used to ‘fix’ troops in an area before other forms of attack are used, like small arms ambushes or sniper attacks. Their collective ability to have a significant impact on the tempo of operations has wide-ranging implications for the planning, resourcing and execution of

² US Department of Defense, *DOD Dictionary of Military and Associated Terms* (Washington, DC: Department of Defense, 2011), p. 171.

³ See Andrew Smith, *Improvised Explosive Devices in Iraq, 2003-09: A Case of Operational Surprise and Institutional Response* (Carlisle, PA: Strategic Studies Institute, 2011).

⁴ Icasualties.org, *Operation Enduring Freedom* (2011), <http://icasualties.org/OEF/index.aspx>.

⁵ Sean Rayment, *Bomb Hunters* (London: Harper Collins, 2011), p. 62.

⁶ DefenceIQ, *IED Chief Gives the Full Story on the British Army Experience in Afghanistan* (2011), <http://www.defenceiq.com/amoured-vehicles/videos/ied-chief-gives-the-full-story-on-the-british-army/>.

⁷ Whitlock, “IED Casualties in Afghanistan Spike.”

⁸ Tom Vanden Brook, “US Cuts Afghan IED Toll By 37%,” *USA Today*, 17 February 2011; and Icasualties.org, *Operation Enduring Freedom*.

⁹ Rayment, *Bomb Hunters*, p. 7.

both ISAF and ANSF operations. For example, IEDs laid in ‘belts’, similar to high-density mine fields, substantially influenced planning during Operation Moshtarak in Helmand Province in February 2010, the biggest ISAF operation since the fall of the Taliban.

10. The increased use of IEDs by insurgents also undermines troop morale. The good news in this regard is that international forces are getting much better at saving the lives of soldiers hit by IEDs. According to military officials, better treatment in the battlefield and faster medical evacuation flights have nearly halved the number of troops killed by IEDs. For example, in September 2010, 24 troops died from 180 IED explosions, while 46 died from 131 hits in the same month a year earlier.¹⁰ However, some evidence suggests that both the rates of amputation, especially of multiple limbs, as well as wounds to the genitals and lower urinary tract have risen substantially recently.

11. Still, military officials sometimes point out that the increased use of IEDs is a sign that the military surge is working because it shows that insurgents need to gain time to regroup and reassemble, under pressure from coalition or Afghan forces. As Lt. Col. Michael Manning, who leads a battalion of Marines in Helmand, argues “[t]he more you disrupt, the more [the Taliban] tries to find ways to disrupt what you’re doing.”¹¹ While this may be true, others point out that the success of NATO counter-insurgency operations should not be judged by a single indicator like this.

12. IEDs not only have a significant military effect, they also affect broader efforts to help Afghanistan on its way towards a stable and prosperous democracy. IEDs injure, maim and kill ordinary Afghans and hamper their freedom of movement, directly challenging a counter-insurgency effort that emphasises real improvements in the daily lives of Afghans. Today, insurgent groups are responsible for 80 per cent of civilian casualties.¹² The United Nations (UN) and human rights groups have thus shifted the emphasis away from criticising civilian casualties caused by international and ANSF forces, accounting for 10 per cent of civilian casualties, to those caused by the insurgents’ campaign of IED attacks. Indeed, the UN argues that the Taliban employ “unlawful means of warfare through increased use of [IEDs], suicide attacks and assassinations that violate Afghans’ basic right to life and the international humanitarian law principles.”¹³

13. Ultimately, by continuing to impose a heavy casualty count on international troops, the insurgents aim to undermine domestic support for the mission in ISAF countries. As public support for participation in the ISAF mission remains low in a number of Allied and partner countries, sustained military and civilian casualties could erode support even further. For example, in the United States, a June 2011 *New York Times/CBS* poll indicated that 59 per cent of US citizens believe the United States should not be involved in Afghanistan – in late 2009, that number was about 40 per cent.¹⁴

¹⁰ Tom Vanden Brook, “More troops surviving IEDs,” *USA Today*, 20 October 2010.

¹¹ Gregg Zoroya, “IEDs Show Troop Surge Working, US officers,” *USA Today*, 27 September 2010.

¹² Rod Nordland, “Rights Groups Press for War Crimes Investigation of the Taliban,” *The New York Times*, 10 February 2011; and UN Secretary-General, *The Situation in Afghanistan and its Implications for International Peace and Security* (23 June 2011), Report of the Secretary-General, A/65/873-S/2011/381.

¹³ As cited in Rod Nordland, “Afghan Rights Groups Shift Focus to Taliban,” *The New York Times*, 9 February 2011.

¹⁴ Brad Norington, “US Must Hold Its Nerve in Afghan Conflict: Petraeus,” *The Australian*, 17 March 2011; Lucy Madison, “Poll: Four in 5 Approve of Obama’s Plan for Afghanistan Drawdown,” *CBS News’ Political Hotsheet*, 29 June 2011; and Pollingreport.com, *Afghanistan* (2011), available from <http://www.pollingreport.com/afghan.htm>.

B. COMMON TYPES OF IEDS

14. The very fact that IEDs are produced in an improvised fashion means that numerous types of IEDs exist. At a general level, descriptions can focus upon the type of warhead used - such as explosive, nuclear, chemical, biological, radiological or incendiary IEDs - or the delivery method - IEDs can be borne, for example, by vehicles, boats, suicide bombers or civilians under threat to carry them. Alternatively, they can be employed in the form of improvised rocket and explosively formed projectiles.

15. Whilst, to date, the warheads used in Afghanistan have been almost entirely conventional IEDs, both their delivery method and trigger mechanisms vary greatly and are constantly evolving, posing new challenges for troops on the battlefield. The following types of trigger mechanisms are those most commonly employed in Afghanistan, but the list is by no means exhaustive.

1. Command Wire IEDs

16. A command wire IED is an IED that is initiated by an electrical firing cable that gives the firer complete control over the device until detonation occurs. In Afghanistan, the firing wire is often buried under roads, walls or buildings and therefore is very difficult to detect. The device is usually detonated by attaching a small battery to the wire that fires the electrical charge to the explosive device(s). These wires are often very long, in order to protect the firer from the explosion, so overwatchers, so-called 'dickers', are frequently employed to watch the site of such an IED and alert the firer when ISAF or ANSF forces approach. Often, these overwatchers are children, creating many complexities in terms of the military rules of engagement.

2. Radio-Controlled IEDs

17. Radio-controlled IEDs are initiated by radio link. The device is constructed with a receiver connected to an electronic firing circuit. The firer operates the transmission device from a distance, and the signal from the transmitter then causes the receiver to transmit a firing pulse that initiates a switch. Often, this switch fires the initiator, but it can also be used to remotely arm a device. These IEDs can be triggered by any number of different mechanisms, including car alarms, wireless garage openers, cell phones, pagers and encrypted walkie talkies. Most radio-controlled IEDs require a line of sight between the transmitter and receiver devices. This type of IED is the least common form used in Afghanistan, due to the more sophisticated training and equipment that is required to fabricate and lay them. However, the threat from radio controlled IEDs has evolved quickly and is intense in some areas.

3. Victim-Operated IEDs

18. These are IEDs designed to function on contact with their victims. Victim operated IED switches are often well hidden from the victim or disguised as everyday household objects, such as oil cans or crockery. When the object is moved, the IED's switch is triggered. Switching mechanisms include tripwires, pressure plates or mats, spring-loaded releases as well as switches activated when pushed, pulled or tilted. They are often buried on roads to destroy vehicles or are used against foot patrols. These IEDs are the most commonly used in Afghanistan, accounting for approximately 70 per cent of IEDs, according to British military officials. A particularly common form of victim-operated IEDs works with pressure plates. These are often triggered by two hack-saw blades separated using a spacer. Stepping on or driving over these blades completes an electronic circuit, detonating the explosives.

4. Suicide-Borne IEDs

19. Although mainly a method of delivering an IED to its target, suicide-borne IEDs deserve to be mentioned for a number of reasons. Firstly, when seen in the context of a population-centric

counter-insurgency strategy, even the threat of a suicide bombing can have significant effects. By forcing ISAF troops to protect themselves at the expense of interaction with the population, suicide-borne IEDs can temporarily reverse the momentum of counter-insurgency operations. Secondly, suicide bombers are frequently facilitated and 'groomed' by handlers. The networks that handle suicide-borne IEDs are thus often different and separate from normal IED networks. Finally, they are not always operated by the firer. Some suicide vests have secret radio-controlled IEDs, so-called 'chicken switches', which the handler or facilitator can detonate if the suicide bomber backs out. Suicide IEDs, alongside assassinations and abductions, have become an increasingly prominent insurgent tactic in 2011, as they target key Afghan personalities and 'soft' targets in an attempt to destabilise the transition process.

5. Passive Infra-Red IEDs

20. Passive infra-red IEDs use a laser infra-red beam as a trigger mechanism, which is almost undetectable. They produce explosively formed projectiles and proved devastatingly effective in Iraq against even the most heavily armoured vehicles. They were also developed by insurgents to negate the increasing effectiveness of Coalition technologies targeted at blocking radio frequencies. In 2005, Britain accused Iranian sources of providing the technology for these devices to Iraqi insurgents.¹⁵ However, even though evidence exists that simple bomb-making components and training techniques are coming from Iran and Pakistan¹⁶, passive infra-red IEDs have yet to make an appearance in Afghanistan.

C. OVERALL IED TRENDS

21. As already noted, IEDs account for nearly 60 per cent of ISAF and half of ANSF casualties in Afghanistan.¹⁷ They also cause a large number of Afghan civilian casualties. In 2010, 1,859 civilians were killed by IED strikes, an increase of 75 per cent from 2009.¹⁸ Victim operated and command wire IEDs continue to be the biggest killer of ISAF troops, due to their basic but effective design.¹⁹ The use of secondary and tertiary devices in IED attacks, i.e. IEDs planted to explode when first-responders or troops arrive at the scene, is also increasing, meaning that ISAF troops are facing more complex IED attack methodology designed to kill C-IED (counter-IED) teams and as many troops as possible. As with all kinetic events in Afghanistan, IED trends show seasonality, as illustrated in Figure 1.²⁰ In the spring and summer of 2010, increased ISAF security operations may well have contributed to the overall increase in IED events. In the spring of 2010, twice the number of IED attacks occurred than in the same period of 2009. In general, IED attacks represented approximately 25 per cent of all attacks between January 2009 and September 2010. Unfortunately, the most recent data suggests that while the amount of IEDs being found and cleared are increasing significantly, IED usage is as well. Indeed, total IEDs found and exploded in the usually quieter winter months of 2010/11 exceeded the summer totals from 2009.

¹⁵ BBC News, "Iran 'Behind Attacks on British,'" *BBC News*, 5 October 2005, http://news.bbc.co.uk/2/hi/middle_east/4312516.stm.

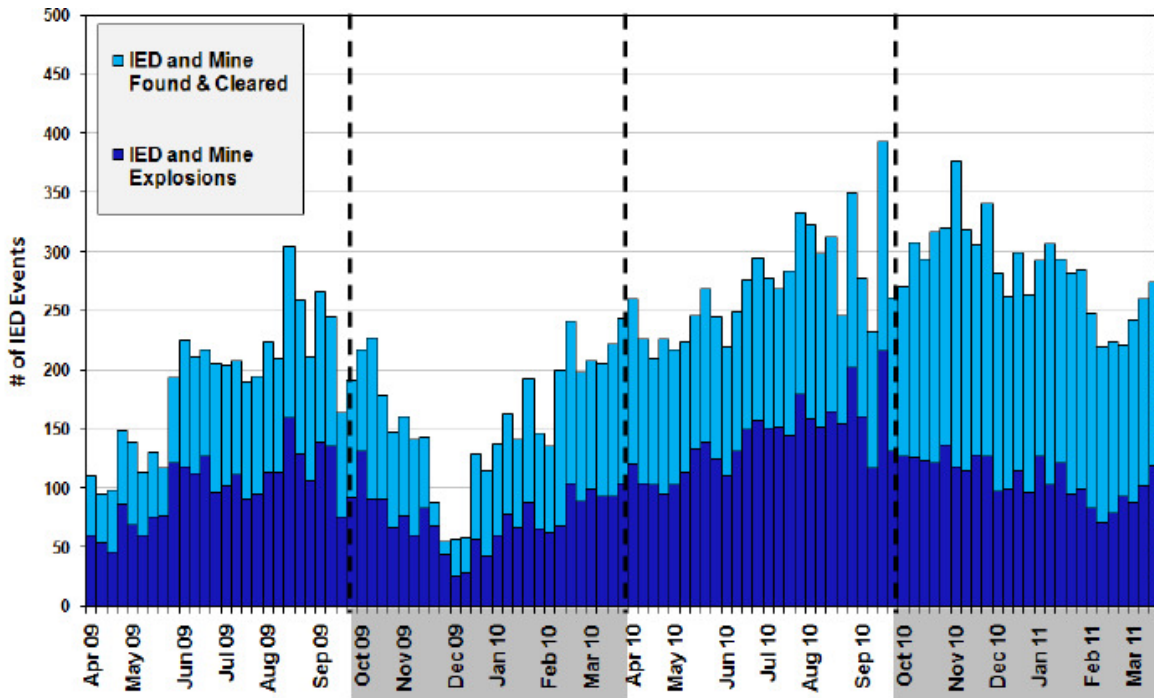
¹⁶ Rayment, *Bomb Hunters*, p.62; and US Department of Defense, *Report on Progress Toward Security and Stability in Afghanistan* (Washington, DC: Department of Defense, November 2010), p. 89.

¹⁷ US Department of Defense, *Report on Progress Toward Security and Stability in Afghanistan*, p. 54.

¹⁸ Tom Vanden Brook, "IEDs Kill More civilian Afghans in 2010," *USA Today*, 5 August 2010.

¹⁹ Paul Richfield, "Innovative Tools Advance Fight against IEDs", *Defence Systems*, 19 January 2011, <http://defencesystems.com/articles/2011/01/24/c4isr-1-counter-ied-tools-and-techniques.aspx>.

²⁰ All numbers in this and the next paragraph are based on US Department of Defense, *Report on Progress Toward Security and Stability in Afghanistan*, p. 54f.

Figure 1. IED Events April 2009 – March 2011²¹

22. Overall, IED activity remains elevated (see above graph). Positively, IED 'found-and-cleared' rates currently remain above 60 per cent of total IED events, the highest since reporting began in 2007. Regional Command South West continues to experience the highest levels of IED activity at 40 per cent of all attacks, though this is slightly less than its overall share of national violence (45 per cent). Regional Command South experiences disproportionately high IED activity (33 per cent), compared to its share of national violence (20 per cent). Recent attacks in Kabul in Regional Command Centre will have pushed its totals up significantly this year.

23. Threat evolution and migration are other key IED trends in Afghanistan. As ISAF deploy different technologies and tactics to mitigate and defeat the IED threat, the complexity of IED production and deployment increases as well. In general, IED fabrication trends seem to be moving in two broad directions: towards simpler bombs fashioned from easily available materials and towards the development of next generation detonation technologies, such as radio-controlled and passive infra-red IEDs.²² To defeat ISAF's radio blocking equipment, insurgents have turned to IEDs that combine command wires and radio triggers. So-called 'daisy chain' IEDs, which consist of numerous, inter-linked IEDs, have been used to cause mass casualties against foot patrols. Victim-operated IEDs have recently been deployed in such a way that the trigger mechanism is positioned away from the device, allowing insurgents to target command elements. There is also a growing insurgent capability in the fabrication of low or non-metal content IEDs, which are largely undetectable with the metal detectors currently used by ISAF troops.

24. Still, there are encouraging signs in C-IED efforts in Afghanistan. With the current surge, coalition forces have apparently disrupted IED networks, to an extent. In the spring of 2011, they have discovered about four times more weapons and explosives than normal, according to

²¹ US Department of Defense, *Report on Progress Toward Security and Stability in Afghanistan*, April 2011, p. 69

²² Brooks Tigner and Nathan Hodge, "Rising to the Challenge: Counter-IED Technology Looks to the Skies," *Jane's International Defence Review*, vol. 41, February 2009, p. 42.

General David Petraeus.²³ Indeed, ISAF now believes that they find more IEDs than the insurgency can currently generate. With over 900 Taliban leaders killed between May 2010 and March 2011, it is also becoming increasingly difficult for the insurgents to recruit experts adept at manufacturing IEDs. Furthermore, there are growing shortages of key IED ingredients. For example, prices for ammonium nitrate have increased tenfold, as networks are disrupted both in Afghanistan and Pakistan. This is also related to the fertilizer ban in Afghanistan, even though most experts believe that it is not working, due to the porous nature of Afghanistan's borders and the need for fertilizer for agriculture.²⁴ The United States has recently successfully urged Pakistan to ban fertilizer exports to Afghanistan.²⁵ The UN Office on Drugs and Organised Crime has also set up programmes to help interdict precursor chemicals entering Afghanistan. ISAF has assessed that the quantity and capability of the Afghan Border Police are slowly but steadily increasing.²⁶ However, the effectiveness of such initiatives remains to be seen. One has to keep in mind that in some areas, such as Sangin in Helmand Province, the IED threat is so pervasive that freedom of manoeuvre is severely limited, and casualty rates have been as high as 50 per cent.

D. ONGOING AND POSSIBLE COUNTER-IMPROVISED EXPLOSIVE DEVICES EFFORTS

25. With the pervasive threat of IEDs, it is unsurprising that individual ISAF nations and NATO as an Alliance have taken steps to remedy the situation. This section lays out the newly instituted NATO C-IED efforts, the focus on disrupting IED networks and developments in the areas of detection and survivability.

1. Strengthened NATO Counter-IED Measures

26. In 2010, NATO has made significant progress towards creating a comprehensive C-IED strategy that tackles the IED problem from numerous angles, but along two main axes: the disruption of IED networks and improved detection of IEDs. In June 2010, a new C-IED Centre of Excellence was opened in Madrid, which the STC will have visited in the fall of 2011. It focuses on defeating the IED systems, with specific reference to technological measures and on the education and training of experts. In August 2010, NATO launched a multi-national C-IED Action Plan aimed at strategic procurement and efficient delivery of C-IED technologies. In October 2010, a conference of national armaments directors of the Alliance added further impetus by creating the Voluntary National Contribution Fund in support of NATO's C-IED Action Plan designed to co-ordinate C-IED efforts across the Alliance. The fund facilitates multi-national co-operation by combining financial and non-financial national contributions in support of specific projects. The first project under this new mechanism supports the training of specialist intelligence teams from Allies and partner states before their deployment to Afghanistan. In March 2011, the United States 7th Army Joint Multinational Training Command in Germany inaugurated a training course for partner nations to train individuals and units for operation in IED environments and improve their home country training capabilities. Although not under NATO auspices, this new programme fills a gap in current Allied and partner nation efforts. Likewise, the European Defence Agency is coordinating co-operation between EU member states on C-IED training and technologies through the Project Team Counter-IED initiative.

27. NATO's C-IED initiative is also supported by NATO's Consultation, Command and Control Agency (NC3A), which is responsible for delivering cutting-edge technology in support of NATO's

²³ Carlotta Gall, "Petraeus Says Coalition Has Stymied Taliban in Much of Afghanistan," *The New York Times*, 9 March 2011.

²⁴ Peter Beaumont, "Taliban Running Short of Deadly Roadside Weapons," *The Guardian*, 3 November 2010.

²⁵ Iftikhar A. Khan, "Fertiliser Export to Afghanistan Banned: US Wants IED Smuggling Materials Stopped," *Dawn*, 6 July 2011.

²⁶ United Nations Office on Drugs and Crime, *Law Enforcement and Border Control* (Vienna: United Nations Office on Drugs and Crime, 2011).

missions and its decision-makers. The current action plan provides member states with a common platform to work on the latest technologies as well as a wider approach that targets IED networks. NC3A will provide a means of co-ordinating joint technology procurements and advanced research and development, in order to exchange information among NATO countries, avoid duplication of efforts and benefit from economies of scale. Furthermore, NC3A will help countries that may not have specific expertise in buying such equipment through, for example, technical evaluations.²⁷ The NC3A held its first C-IED technical co-ordination workshop in November 2010 and has a second in March 2011.

2. Disrupting IED Networks

28. Critical to the long-term success of the counter-IED effort is the strategy to attack the networks that surround IEDs, which is an integrated part of the insurgency, rather than a separate network, as has been the case in other theatres: the financiers, suppliers, transporters, builders, planners, emacers and triggermen. Intelligence assets play an important role in identifying and disrupting these networks by intercepting communications, as does the examination of IEDs after they have been disarmed or destroyed. With these methods, ISAF is better able to interdict IED materials and the insurgents involved in making them.²⁸

29. Aerial surveillance assets have proven especially effective in detecting IEDs, observing emplacement patterns and even deterring emplacement in the first place, thus disrupting IED networks. This approach is dealt with in greater detail in the section on unmanned systems in the Afghan theatre.

30. Specialist investigative teams have been used widely in Afghanistan. Their job is to exploit disarmed or destroyed devices for information on those who fabricate them. From October 2008 until September 2009, roughly 5,000 fingerprints were found on IEDs or their remains.²⁹ According to the JIEDDO, this has “enabled the identifications and detention of hundreds of suspects”³⁰. However, critics question the utility of exploitation, due to the underdeveloped Afghan justice system. In fact, some leading C-IED nations have recently stopped trying to exploit devices.³¹

31. Recent successes and optimism about efforts aimed at neutralizing IED networks have led some to think that IED networks can be effectively neutralized relatively quickly. However, in order to strategically defeat networks, a long-term effort is required. Indeed, General Michael L. Oates, Director of the JIEDDO, argues that “[t]he whole idea isn't to destroy the network. That may be impossible. It's to disrupt them.”³² In turn, detection and survivability become ever more vital to mitigate the challenge from IEDs.

3. Detection and Survivability

32. Up-to-date and capable training lies at the heart of successful IED detection, for ISAF and ANSF forces alike. Formal and informal C-IED training for regular ISAF and ANA units occurs throughout Afghanistan, for example by embedded trainer teams or ISAF's Counter-IED Task

²⁷ NATO C3 Agency, “NATO Launches Multi-National Counter-IED Initiative,” *NATO C3 Agency News*, 12 August 2010, <http://www.nc3a.nato.int/news/Pages/20100812-CIED.aspx>.

²⁸ Tania Reid, “Counter IED Efforts Try o Get “Left of the Boom” in Afghanistan,” *ISAF News*, July 2010, <http://www.isaf.nato.int/article/news/counter-ied-efforts-try-to-get-left-of-the-boom-in-afghanistan.html>.

²⁹ Walter Pincus, “Taliban bombs are killing fewer troops,” *The Washington Post*, 26 September 2010.

³⁰ Pincus, “Taliban bombs are killing fewer troops.”

³¹ Sean Rayment, “Commanders to Change Bomb Disposal Tactics,” *The Daily Telegraph*, 12 February 2011.

³² Whitlock, “IED Casualties in Afghanistan Spike.”

Force Paladin³³ Indeed, military officers often underline that successful C-IED efforts rely 60 per cent on proper training of the troops, while 30 per cent depend on technology and 10 per cent on luck. Speedy knowledge transfer, threat evolution analysis and co-ordinated C-IED training between militaries are crucial to saving lives in the short term. The sharing of tactics, techniques and procedures between units and commands has already had a positive impact on C-IED efforts.

33. A number of technical measures designed to detect and neutralise IEDs have been developed over the years. By some estimates, JIEDDO has spent about USD 10 billion on such technology since 2006.³⁴ The NC3A has divided the areas of C-IED support into three main areas: jammers against remote-controlled IEDs; vehicle, cargo and pedestrian scanners to detect vehicle-borne and suicide bomber IEDs; and surveillance technologies to improve intelligence on the sources of IEDs and pre-empt an attack. Improved man-portable detection devices, including the UGVs discussed in the next section, would also be a force multiplier for ground troops. The deployment of closed circuit surveillance cameras in forward-operating bases has increased force protection for frontline troops with 24-hour real time coverage of their areas of operation as well. Biometric data collection is also reportedly having a positive impact on C-IED efforts.³⁵ Ground-penetrating radars represent another technological option for detecting deep-buried IEDs, but a workable solution remains to be found. Although highly sensitive and closely guarded by member states, the development of radio frequency jammers also continues, as does the use electro magnetic pulse technologies to destroy radio-controlled IEDs.³⁶ Other technological avenues also show promise, in the opinion of certain experts, but are still far from being able to be put into practice: automatic detection algorithms for UAVs or land vehicles, Raman spectroscopy and high-powered micro-waves among them. NATO's Industrial Action Group (NIAG) is also examining the potential for aerial assets which can better detect IEDs.

34. Furthermore, more basic measures of detection have been employed in response to the IED threat. Some military officials believe that specially trained search dogs are still the most effective way to detect IEDs. While factors such as heat and limited durability on patrols are the drawbacks of dog teams, demand for bomb-sniffing dogs has nevertheless vastly increased. The US Marines, for example, are increasing the number of dogs employed in Afghanistan by 150 per cent in 2011, from 170 to about 280 dogs.³⁷ Bill Childress, manager of the Working Dog Programme, argues that "[t]he most versatile, mobile piece of equipment we can find is the dog's nose."³⁸

35. In terms of survivability, vehicle designs are continuously evolving to counter the IED threat. Floating V-shaped hulls, increased armour and better design are common to the safest vehicles now operating in Afghanistan, such as the Mine-Resistant Ambush-Protected (MRAP), Mastiff and Ridgeback armoured patrol vehicles. Roller systems have been attached to vehicles to reduce the effectiveness of pressure-detonated, victim-operated IEDs and to maintain mobility, as have jammer systems. Vast improvements in military medical systems and equipment technology, such as surgical teams on casualty extraction helicopters, better haemorrhage-preventing medical equipment and shortened flight times from the battlefield to the nearest hospital, continue to lower the lethality of successful IED strikes, as have improvements in lightweight body armour.

36. ISAF forces have recently turned to C-IED tactics that could prove damaging to the international community's counter-insurgency efforts as well. In reaction to insurgents rigging

³³ UK Ministry of Defence, "British-Trained ANA Soldier Becomes Bomb Disposal Hero," *Defence News*, 1 February 2011; and Soldier of Fortune Editor, "ANA Soldiers Successfully Complete Counter-IED Training," *Soldier of Fortune*, 28 March 2011.

³⁴ Shaun Waterman, "General: K-9 Teams Sniff Out IEDs Better," *The Washington Times*, 21 October 2010.

³⁵ UPI, "Biometric System Working in Afghanistan", *UPI*, 14 July 2011.

³⁶ Tigner and Hodge, "Rising to the Challenge: Counter-IED Technology Looks to the Skies."

³⁷ Tony Perry, "The Most Loyal Kind of Marine," *Los Angeles Times*, 8 February 2011.

³⁸ Perry, "The Most Loyal Kind of Marine."

whole buildings and even villages with IEDs, international troops have sometimes turned to wholesale destruction. For example, the village of Tarok Kalache was razed by coalition forces with over 20 tonnes of explosive because it was seen as a tactical base of the Taliban.³⁹ While such tactics might be less dangerous to troops, and locals are compensated for damages, they often evoke increasingly negative sentiments within the population. One diplomatic source has stated that this tactic is “unpleasant but necessary”, as the Taliban are focusing “all their efforts in turning villages into giant booby traps to try and kill as many coalition troops as possible.”⁴⁰ Also, the Afghan Independent Human Rights Commission in Kandahar has not yet received complaints from the population over this practice.

37. IEDs are a deadly threat in Afghanistan and will remain so for a long time to come, as they are very cheap and comparatively easy to assemble. So far, no breakthrough in C-IED efforts has been achieved, even though some promising avenues are being pursued by ISAF nations. Two important pieces for overcoming or, at least, partially mitigating the threat of IEDs are the ever-increasing presence of UAV and UGV capabilities in-theatre. Their contribution to C-IED efforts as well as their wider effects on the ISAF mission is examined in the next section.

III. UNMANNED SYSTEMS IN THE AFGHAN THEATRE

38. Unmanned systems, whether aerial or ground, are an integral part of ISAF efforts in Afghanistan. As drones and ground robots become ever more sophisticated, they represent the technological cutting edge of the mission. This section therefore looks at the role of unmanned systems in Afghanistan. In addition, the covert, non-ISAF drone campaign in neighbouring Pakistan is discussed, as it is very controversial – especially with US-Pakistan relations at their worst in a decade after the raid on Osama bin Laden – and has a direct impact on the Allied and partner efforts in Afghanistan itself.

A. UNMANNED SYSTEMS IN CONTEXT

39. Unmanned systems are one of the fastest growing sectors of the defence industry. Particularly the market for UAVs, which is expected to grow to about USD 70-80 billion within the next decade, is booming.⁴¹ In fact, former US Secretary of Defense Robert Gates believes that the upcoming generation of F-35 fighter jets will be the last manned fighter aircraft.⁴² The production and deployment of unmanned systems is accelerating rapidly, proliferating in both absolute numbers as well as in the number of states that possess such systems. Today, more than 50 countries have UAVs or plan to buy or build them.⁴³ The American military has the largest inventory. Its UAV fleet numbers more than 7,000 units today, compared to merely 167 in 2001.⁴⁴ UAVs also play an important role in operations in Libya to implement UN Security Council Resolution 1973 and protect the civilian population, operations which are currently led by NATO with assistance from Jordan, Qatar, Sweden and the United Arab Emirates. Since 2001, over 6,000 UGVs have been fielded worldwide.⁴⁵

³⁹ Tom Coghlan and Michael Evans, “Scorched-Earth Tactic Loses Hearts and Minds in Battle with Taleban,” *The Times* (London), 24 January 2011.

⁴⁰ Coghlan and Evans, “Scorched-Earth Tactic Loses Hearts and Minds in Battle with Taleban.”

⁴¹ IISS, *The Military Balance 2011* (London: Taylor and Francis Group, 2011), p. 23.

⁴² Nic Robertson, “How Robot Drones Revolutionized the Face of Warfare,” *CNN*, 27 July 2009, <http://edition.cnn.com/2009/WORLD/americas/07/23/wus.warfare.remote.uav/>.

⁴³ Patrick M. Miller, *Mini, Micro, and Swarming Unmanned Aerial Vehicles: A Baseline Study* (Washington, DC: Federal Research Division of the Library of Congress, 2006), p. 1.

⁴⁴ Gerhard Dabringer, “Ethical Challenges of Unmanned Systems,” in *Ethica Themen: Ethical and Legal Aspects of Unmanned Systems Interviews*, ed. Gerhard Dabringer (ed.) (Vienna: Institut für Religion und Frieden, 2010), p. 8.

⁴⁵ Michael W. Isherwood, “Unmanned Systems and the Joint Team,” *Joint Forces Quarterly*, no. 58, third quarter 2010, p. 58.

40. The media has focused extensively on UAV strikes, but the truth is that the great majority of UAVs and UGVs are used in more benign roles, most importantly surveillance and explosive ordnance disposal. The two most common systems currently being used, for example, are surveillance planes and explosive ordnance disposal robots. Indeed, in 2009, 97 per cent of UAV flights fulfilled ISTAR roles,⁴⁶ and armed UGVs for border control missions are only used by Israel and North Korea⁴⁷. It must also be remembered that all drone strikes are remote-controlled, either in-theatre or from a distance, thus leaving a human element in the equation. In fact, a great number of people are still required to fly unmanned missions - often some 180 personnel -, although militaries are trying to reduce the number of support staff used for such operations.

41. The key advantage of unmanned systems is their relative cheapness and expendability, in contrast to human personnel. UAVs, for example, are comparatively inexpensive in their simple configurations. A basic Predator unit costs USD 4.5 million, whereas an F-35 Joint Strike Fighter may cost up to USD 128 million without upgrades and overhauls, according to the Canadian Parliamentary Budget Officer.⁴⁸ However, a recent UK Ministry of Defence Joint Doctrine Note argues that, under current projections, "it is likely that the costs of complex unmanned aircraft will increase to converge rapidly with those of manned aircraft."⁴⁹ Another key advantage is an endurance that cannot be matched by human pilots. Whereas soldiers on ISTAR missions usually lose their effectiveness after a certain number of hours, a Predator can stay in the air for up to 40 hours, for example. Thus, drones can often hover for hours over acquired targets. Precision is a crucial aspect as well. Hellfire missiles, a common type employed with the widely-used Predator and Reaper models, are more precise than air strikes conducted by manned bombers. Still, they often cause collateral damage, and, hence, the defence industry is working hard to develop smaller and more precise missiles, designed for urban use, such as the 35-pound, 11-cm-in-diameter Scorpion or the even smaller 13-pound Small Tactical Munition.

42. For all their advantages, however, it should be remembered that current unmanned systems are still very vulnerable to failure. Once launched, UAV sometimes go missing and crash. UGVs often spin out of control when they encounter radio frequency interference. Indeed, it only takes 1950s technology to take out 21st century technology. Simple disrupters with short ranges can be made in a few hours with USD 200 worth of readily available electronic equipment.⁵⁰ In the Iraq and Afghanistan missions, the United States has experienced about 80 accidents related to UAVs. Still, loss rates per thousand flying hours remain similar between UAVs and manned aircraft.⁵¹

43. Armed UAVs are now a standard element in operations, but the development of UGVs still lacks behind expectations. In 2001, the US Congress wanted a third of the ground combat vehicle fleet to be remotely controlled.⁵² This has not happened. The vast majority of UGVs today is still used for explosive ordnance disposal purposes. Nevertheless, interest in armed UGVs remains high. New UGV concepts envision transporting supplies, such as unmanned trucks following lead convoy vehicles, which the United Kingdom has recently introduced in Afghanistan, and mobile medical units. Unsurprisingly, the most controversial project is to mount weapons onto robotic

⁴⁶ Joe Pappalardo, "4 Forgotten Facts About UAVs," *Popular Mechanics*, 8 September 2009.

⁴⁷ Prof. Patrick Lin (Director, Ethics and Emerging Sciences Group at Cal Poly, San Luis Obispo), in an interview given to NPR's *Talk of the Nation*, 4 October 2010, <http://www.npr.org/templates/story/story.php?storyId=130329148>.

⁴⁸ Peter W. Singer, *Wired for War*, (New York: Penguin Press, 2009), p. 32; and Peter Weltman and Tolga Yalkin, *Comparing PBO and DND Cost Estimates on Canada's Proposed Acquisition of the F-35 Joint Strike Fighter: Some Preliminary Questions and Answers on Key Issues* (Ottawa: Office of the Parliamentary Budget Officer, 2011).

⁴⁹ Development, Concepts and Doctrine Centre, UK Ministry of Defence, "The UK Approach to Unmanned Aircraft Systems," *Joint Doctrine Note*, 2/11, 2011, p. 1-2.

⁵⁰ Singer, *Wired for War*, p. 199f.

⁵¹ Development, Concepts and Doctrine Centre, UK Ministry of Defence, "The UK Approach to Unmanned Aircraft Systems," p. 1-4.

⁵² Paul McLeary and Sharon Weinberger, "Free The Bots," *Defense Technology International*, 1 March 2011.

platforms, making them mobile, autonomous and capable of applying lethal force with extreme precision. The United States, for example, has tested a number of armed UGVs and has a genuine interest in introducing them into the battlefield. Armed UGVs are extremely precise. In recent tests, a US Army prototype successfully hit the target every time, with a variety of weapon systems, from up to 2,000 m.⁵³ By integrating new types of radar sensors, UGVs could be mounted with the ability to essentially see through walls.⁵⁴ In fact, three armed prototypes were shipped to Iraq for base patrol missions. Legal reasons, however, led the US military to abandon this plan, as it was feared that the robots would not respect the rules of engagement, for example, warning intruders before firing or using tear gas before live ammunition.⁵⁵

44. The increasing 'robotisation' of warfare has spawned extensive ethical and legal debates. Advocates argue that the targeting precision of UAVs, for example, reduces collateral damage, compared with other weapon platforms. Furthermore, the absence of human emotions, such as hatred or vengeance, reduces errors. Over the long term, advances in artificial intelligence could, in fact, lead to unmanned systems that respect international law, humanitarian conventions and rules of engagement better than soldiers ever could. Critics, however, believe that 'robotisation' creates a distance between attackers and their targets, making violence less tangible and easier to accept. A reduction of the risks of warfare could thus make the use of force in international relations an easier option, pushing the boundaries of violence as a truly last resort. The aforementioned UK Joint Doctrine Note addresses the question of future acceptable machine behaviour, fearing that policy trails behind real-world developments: "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?"⁵⁶

45. Legal concerns centre on the question of responsibility for actions, for example in relation to civilian casualties or war crimes, and the specific usage of UAVs. Indeed, to a varying degree, the UN, Amnesty International and Human Rights Watch have all criticised the use of unmanned systems with regard to, for example, failures to discriminate between non-combatants and combatants and conducting undeclared wars with little risk of reprisal. Carrying out an inquiry into the practice of drone strikes, the UN's Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Philip Alston, warned that UAVs might be "operated in a framework which may well violate international humanitarian law and international human rights law" and that the United States has to show that drone strikes do not constitute illegal extrajudicial executions.⁵⁷ However, the United States maintains that it is in compliance with international as well as national law. Any new weapon system has to be approved by the Judge Advocate General's Corps, the legal branch of the US Armed Forces. Furthermore, the US State Department argues that al-Qaeda is engaged with the United States in armed conflict, making it legal to target its leaders as a form of self defence.

B. UNMANNED AERIAL SYSTEMS IN AFGHANISTAN

46. On 14 November 2001, the first strike of an armed UAV took place in Afghanistan, when a combined F-15/Predator attack killed Taliban and al-Qaeda fighters, including Mohammed Atef, al-Qaeda's senior military commander and one of the key planners of the attacks of 11 September 2001. Since then, UAVs have become an integral part of the military efforts in the

⁵³ GlobalSecurity.org, *TALON Small Mobile Robot* (2011), <http://www.globalsecurity.org/military/systems/ground/talon.htm>.

⁵⁴ David Axe, "There's No Hiding From New Breath-Detecting Robot," *Wired*, 7 February 2011, <http://www.wired.com/dangerroom/2011/02/theres-no-hiding-from-new-breath-detecting-robot/>.

⁵⁵ John Markof, "War Machines: Recruiting Robots for Combat," *The New York Times*, 27 November 2010.

⁵⁶ Development, Concepts and Doctrine Centre, UK Ministry of Defence, "The UK Approach to Unmanned Aircraft Systems," p. 5-11/12.

⁵⁷ Mir Adnan Aziz, "Drones Fuel the Fire," *The News* (Pakistan), 6 June 2010.

country. Especially in the wake of the drawdown in Iraq, an increasing number of UAVs are redeployed from Iraq to the Afghan theatre.

47. While the Afghanistan operation revolves around land forces, it features a significant air component as well. The most prominent role of UAVs in the Afghan theatre is in ISTAR, in which their remote sensor capabilities are utilized to the fullest. Still, armed UAVs are common as well. Often employed in co-ordination with troops on the ground, they take out insurgent infrastructure and leaders. Of course, drones can easily switch from an ISTAR mission into a strike asset, if armed.

48. At least nine ISAF states operate or will soon be deploying drones in Afghanistan: Australia, France, Germany, Italy, the Netherlands, Spain, Sweden, the United Kingdom and the United States. Models range from small tactical UAVs, which perform 'over-the-hill' reconnaissance, over prime-strike vehicles, such as the Predator or Reaper, to high-altitude surveillance models such as the Global Hawk. UAVs are indeed very effective when deployed alongside ground forces or attack and armed scout helicopters in Afghanistan. Troops on the ground benefit from all types of UAVs, those that overwatch the battlefield from far above and those that they bring with them into operations to spy on their near vicinity.

49. As the commanders of one Canadian battalion deployed in Kandahar Province during 2008 put it, UAVs "allowed us to stay in contact with the enemy virtually and maintain a high tempo of operations through surveillance and strikes in selected areas of the battlespace."⁵⁸ The effectiveness of this tool means that ground forces can allocate more resources and time to interact with the Afghan population, a key goal of the current counter-insurgency strategy. Unburdened by air defences, UAVs can also reach far into insurgent territory, where it would be difficult to insert ground forces. Furthermore, strikes on insurgent forces create fear and uncertainty and limit their freedom of action.

50. Naturally, a number of challenges are involved in applying a joint air/land approach to counter-insurgency operations in Afghanistan, as this approach is still relatively new on the battlefield. Also, insurgents are adapting to coalition UAV tactics by travelling in smaller groups and hiding under blankets on sun-warmed rocks in order to avoid detection. The already-mentioned Canadian battalion, for example, points to several operational needs as well:

- developing and maintaining clear lines of command as well as good informal relationships;
- understanding best employment practices in the field, including efficient synchronisation of ground and air manoeuvres and proper adherence to the rules of engagement; and,
- establishing an accurate picture of friendly as well as enemy forces, including a precise targeting methodology⁵⁹.

51. UAVs play an especially important part in coalition efforts to counter the threat from IEDs. They contribute to C-IED in three substantial ways: locating and striking the wider IED network, discovering and neutralising emplacement teams, as well as detecting IEDs already in place.

52. In their ISTAR role, UAVs enable ISAF forces to get a clearer picture of how the wider IED network in Afghanistan functions and develops over time. For example, with the new Gorgon Stare technology that consists of up to 65 different video feeds and was recently deployed to the

⁵⁸ Luther S. Turner, D. Corbould, Jason T. Adair and Louis Hamel, "Optimizing Deadly Persistence in Kandahar: Armed UAV Integration in the Joint Tactical Fight," *The Canadian Army Journal*, vol. 13, no. 1 (2010), p. 120.

⁵⁹ Turner, Corbould, Adair and Hamel, "Optimizing Deadly Persistence in Kandahar: Armed UAV Integration in the Joint Tactical Fight," p. 120ff.

theatre, the US Air Force can now conduct wide-area surveillance of whole cities. However, fully utilizing this platform requires up to 2,000 analysts. As ISAF forces build up their knowledge, UAVs can then be brought to bear upon individuals or infrastructure critical to the production and distribution of IEDs in the country. Ideally, UAV strikes can appreciably disrupt the flow of IEDs.

53. UAV flights also try to spot insurgents who are in the process of placing IEDs. The US military, for example, currently has over 25 'round-the-clock' surveillance patrols in the air, compared to only nine in 2008.⁶⁰ Convoy roads are a prime target for laying IEDs. Countries like Australia thus watch over key roads with unarmed surveillance drones, and British and American UAVs, equipped with missiles, neutralise bomb planters if spotted.

54. A US Army unit, deployed to Iraq in 2006, called Task Force ODIN (short for Observe, Detect, Identify and Neutralise), has become the standard in orchestrating joint manned and unmanned missions to combat IEDs. Using traditional sensor systems, such as electro/optical and infrared sensors, UAVs attempt to find IED insurgent teams who place IEDs under the cover of night. This concept has, somewhat belatedly, found its way to Afghanistan as well. A task force called Falcon Strike was deployed in Ghazni Province in the East as a result of the ISAF surge. As of September 2010, it had killed 43 planters, reducing IEDs along the major convoy roads in the area by almost half, compared to the same period of the year before.⁶¹

55. Some UAVs are also equipped to find IEDs that have already been planted, by detecting changes in the environment or electro-magnetic signals. The United States has, over the last year, increased the teams in charge of finding roadside IEDs from roughly 10 to 75.⁶² These teams often have 'hand-held' UAVs for short-distance surveillance. These drones can be the size of model air planes, with plans to reduce the size even further. Indeed, the United States is funding new programmes to develop small rotary wing UAVs to detect IEDs, which would not have to be flown by operators, but could function autonomously. Depending on the model, these would possess high-definition electro-optical sensors, detect unintentional electromagnetic emissions, be used as an escort for convoys, flying ahead and monitoring the road, or have texture-recognition systems, whereby their cameras could determine whether soil was recently turned in order to find areas where objects have been buried. Military sources have, however, noted the very low success rates of such detection flights at present and questioned this approach's viability. Another key challenge in this regard, however, is to find ways for the UAVs to operate properly in the jamming frequencies that are emitted by convoys to neutralise certain types of IEDs.

56. Although not entirely falling into the category of UAVs, observation balloons warrant a mention, as they fulfil similar roles to UAVs and because a rapidly increasing number is being deployed to bridge gaps in the procurement of new UAVs. According to Ashton Carter, the US Undersecretary of Defense for Acquisition, Technology and Logistics and currently nominated as the next Deputy Secretary of Defense, demand for surveillance equipment from commanders in Afghanistan is 20 times higher than the rate of supply, generating the need for these balloons.⁶³ Cost is another reason for their popularity. With unit costs at about USD 10 million, including the needed equipment and personnel, they are roughly half as expensive as an UAV equipped for similar purposes.⁶⁴ At this point, more than 60 balloons are tethered in the skies over Afghanistan, and the United States aims to double this number in 2011.⁶⁵ Flying about 600 m above ground, the balloons can monitor activities in large areas, having a maximum sensor range of about 32 km. They will also soon be able to focus multiple sensors on villages simultaneously.⁶⁶ These so-called

⁶⁰ Tom Vanden Brook, "Spy Balloons Go Into High Demand in Afghanistan," *USA Today*, 28 September 2010.

⁶¹ Bill Gertz, "Inside the Ring," *The Washington Times*, 30 September 2010.

⁶² Whitlock, "IED Casualties in Afghanistan Spike."

⁶³ Vanden Brook, "Spy Balloons Go Into High Demand in Afghanistan."

⁶⁴ Vanden Brook, "Spy Balloons Go Into High Demand in Afghanistan."

⁶⁵ Whitlock, "IED Casualties in Afghanistan Spike."

⁶⁶ Whitlock, "IED Casualties in Afghanistan Spike."

'blimps' provide situational awareness, like UAVs, but have the added benefit of providing deterrence, due to their visibility to insurgents, as well as reassurance for the local population, which ideally should feel more secure being watched in this way.

C. UNMANNED GROUND VEHICLES IN AFGHANISTAN

57. Today, more than 2,000 UGVs operate in Afghanistan.⁶⁷ Originally, the main purpose of practically all UGVs sent to conflict zones was explosive ordnance disposal. Today, however, about a third of the robots sent to Afghanistan are used for other purposes, such as reconnaissance, surveillance, patrolling and other, classified functions.⁶⁸

58. While many experts argue that UGV development has not yet lived up to its overall promises, it is clear that UGVs play an important role in the Afghanistan operation. The most common purpose of UGV is explosive ordnance disposal, which is a comparatively easy task. Most such UGVs look like the well-known rover used in the 1998 NASA mission to Mars, i.e. a small tracked vehicle with a protruding arm at the top that can be adapted to the specific purpose. Often, such models can be blown up, put back together and sent back into the field, while still achieving an impressive 90 per cent success rate.⁶⁹

59. That said, critics argue that heat, weight and tactical factors mean that UGVs are, in reality, often deemed unpractical for use in theatre. Indeed, as one observer argues, "[j]ust because one can do something, it does not mean one has to, and the next generation of UGVs will need to provide clear utility to military commanders."⁷⁰ Thus, in Afghanistan most explosive ordnance disposal teams still defuse devices by hand.

60. A variety of unmanned vehicles are used for locating, identifying and disarming IEDs, and the remains are subsequently collected as forensic evidence.⁷¹ Some of the most common types of explosive ordnance disposal UGVs in use in Afghanistan are the following.

- The MarcBot is an 11-kg UGV used for inspection, for example of vehicles or compounds. At about USD 8,000, it is also a low-cost unit;
- The Mini-EOD is a small man-portable UGV of about 16 kg, which can conduct operations in urban, rugged or constricted terrain, such as tunnels or caves. It is in high demand in Afghanistan. About 300 units are in-theatre today⁷²;
- The Talon comes in two sizes: roughly 30 or 55 kg. The heavier version, in particular, is popular with troops because of its strong arm and manipulator⁷³;
- The PackBot weighs in at 30 kg as well. It can be equipped with a number of kits, including acoustical detection systems to locate snipers;
- The M-160 (MV4B) is a larger, car-sized robot on tracks that clears mine or IED fields by striking the soil with metal flails on a roller in front of the vehicle.

⁶⁷ David Axe, "One in 50 Troops in Afghanistan Is a Robot," *Wired*, 7 February 2011, <http://www.wired.com/dangerroom/2011/02/1-in-50-troops-robots/>.

⁶⁸ Stew Magnuson, "'Robot Army' in Afghanistan Surges Past 2,000 Units," *National Defense*, 2 February 2011, <http://www.nationaldefensemagazine.org/blog/Lists/Posts/Post.aspx?ID=300>.

⁶⁹ Magnuson, "'Robot Army' in Afghanistan Surges Past 2,000 Units."

⁷⁰ Huw Williams, "War of the Robots: Transforming the Future of Ground Combat," *Jane's International Defence Review*, vol. 44, August 2011, p. 42.

⁷¹ Jeff Jaczkowski, "Equipping Joint Warfighters Through Modernization of Unmanned Ground Systems (UGS)," *Army AL&T*, July-September (2010), p. 18.

⁷² Jaczkowski, "Equipping Joint Warfighters Through Modernization of Unmanned Ground Systems (UGS)."

⁷³ Magnuson, "'Robot Army' in Afghanistan Surges Past 2,000 Units."

61. Another category of UGVs used in Afghanistan are the so-called throwbots. Often used in explosive ordnance disposal missions as well, they are designed to be dropped from several metres of height or thrown horizontally. They can then explore the target area and transmit sensor data, such as video feeds, to the operator, either adding valuable distance in explosive ordnance disposal missions or concealment, if used for reconnaissance. The Dragon Runner, for example, comes on four wheels at 4 kg and is used by the Marines. The US Army 5th Stryker Brigade Combat Team is already using the Dragon Egg, which is a baseball-shaped camera that can be thrown and is 'self-righting'.⁷⁴ Throwbots are also becoming smaller, with the Recon Scout at only 0.5 kg, for example.

62. Ultimately, the UGVs in use in Afghanistan are still at the lower end of the technological spectrum, at least the commercial, non-secret, 'off-the-shelf' products. The US military is still pushing ground robots, but it is unclear when prototypes of newer concepts, such as unmanned all-terrain vehicles or networked, semi-autonomous groups of UGVs controlled by a single operator, can be fielded in substantial numbers.

D. DRONE STRIKES IN PAKISTAN

63. Under President Obama, the United States has considerably stepped up the controversial, secret drone strikes on suspected militants in Pakistan. These strikes have come under renewed and extensive scrutiny and criticism after the Abbottabad raid on Osama bin Laden. Notably, the operation was not carried out by a drone strike, but by US Special Forces on the ground, with a low-observable RQ-170 Sentinel providing surveillance and a continuous data feed to the White House. Since his inauguration in 2009, the President has presumably ordered or approved up to 223 drone attacks, according to the New America Foundation, a non-partisan US think tank that closely monitors the UAV campaign in Pakistan, keeping in mind that the United States does not publicly deny or confirm these strikes.⁷⁵ At the time of writing, 52 strikes had already taken place in 2011. In contrast, the Bush Administration ordered only about 50 attacks in eight years.⁷⁶ With the move of Leon E. Panetta, the former Director of the CIA, to the Department of Defense as its Secretary and General David Petraeus taking up the CIA's position, this trend is likely to continue, as both are seen as strong advocates of US drone strikes. Already, the Department of Defense has requested a 75 per cent increase in funding for drone operations in Pakistan.⁷⁷ As some in the Obama Administration currently see al-Qaeda in a critical state, with Panetta saying the United States is "within reach of strategically defeating al-Qaeda"⁷⁸, these so-called 'surgical strikes' will most likely gain even more prominence in the US mission to defeat al-Qaeda. Indeed, with a recent strike in Somalia, the country has become the sixth where such strikes were registered, joining Afghanistan, Iraq, Libya, Pakistan and Yemen.

64. After the raid in Abbottabad, which Pakistan's authorities have vehemently protested against as a severe violation of their sovereignty, criticism of the drone strikes within Pakistan has reached new levels. In May, Parliament formally condemned the recurring strikes and demanded an end to them. Prime Minister Yousuf Raza Gilani has done likewise. US and Pakistani officials have said that US drone strikes from Pakistani-based drones stopped weeks before the raid on bin Laden. Yet, strikes on Pakistani soil, presumably from bases in Afghanistan, have continued. In early June, for example, a drone strike allegedly killed Ilyas Kashmiri, an al-Qaeda operative connected to the Mumbai terrorist attack of 2008 and a high-value target for both Pakistan and the United States.

⁷⁴ McLeary and Weinberger, "Free The Bots."

⁷⁵ New America Foundation, *The Year of the Drone: An Analysis of US Drone Strikes in Pakistan, 2004-2011* (August 2011), <http://counterterrorism.newamerica.net/drones>.

⁷⁶ Brinkbäumer and John Goetz, "Taking Out the Terrorists by Remote Control."

⁷⁷ Jemima Khan, "The Things You Say Sound Great, Mr President. So Why Do You End Up Disappointing Us?," *The Independent*, 25 June 2011.

⁷⁸ Elisabeth Bumiller, "Panetta Says Defeat of Al Qaeda Is 'Within Reach'," *The New York Times*, 9 July 2011.

65. Various criticisms have been levelled at the drone campaign in Pakistan and outside of Pakistan. The UN's Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Philip Alston, for example, has called for greater transparency, the creation of better safeguards and rules, the publication of the number of civilian casualties and a demonstration that this approach was used as a last resort. While UAV missions in Afghanistan are conducted by armed forces under a UN mandate, attacks in Pakistan are covert missions undertaken by the CIA and, as critics argue, without a clear legal mandate to conduct lethal actions. Notably, in a rare criticism of the Obama administration by a former official, Admiral (ret.) Dennis C. Blair, Director of National Intelligence until 2010, has painted the drones strikes as counter-productive and a catalyst for terrorist recruitment. Of course, the CIA does not address secret operations, but on at least one occasion the CIA has indirectly acknowledged these strikes, with Panetta, then Director of the CIA, even calling them "the only game in town in terms of confronting and trying to disrupt the al-Qaeda leadership."⁷⁹ As set down in an executive order by President Ford, "No employee of the United States Government shall engage in or conspire in political assassination"⁸⁰. Both the Bush and Obama Administrations, however, argue that the ban on assassinations does not apply to al-Qaeda or Taliban leaders, who are considered enemy commanders. State Department Legal Advisor Harold Koh has thus underlined that, "there is no prohibition under the laws of war on the use of technologically advanced systems in armed conflict – such as pilotless aircraft or so-called smart bombs – so long as they are employed in conformity with applicable laws of war."⁸¹ Pakistan, for its part, has not officially sanctioned US strikes on its territory, but senior officials from both countries have said, under the cover of anonymity, that there is, at least, a tacit understanding between them.⁸² Indeed, at least some attacks are conducted from bases inside Pakistan.⁸³ Documents released by Wikileaks have also supported this interpretation. It remains unclear what the current status of the understanding between Pakistani and US authorities on this issue is, given the current outcry from the public, politicians and military officials.

66. The precise US guidelines for applying lethal force during UAV missions in Pakistan are, naturally, classified. However, Amitai Etzioni, a national security expert from George Washington University, has said, based on confidential interviews, that a points system is being used, whereby higher numbers are allotted to civilians in the target area and lower numbers to enemy combatants – the higher the value of the target, the lower the numbers.⁸⁴ The higher the total score, the less likely it is that the strike will be approved and the higher up the decision must be made. Sources familiar with the procedures say that the US Ambassador to Pakistan must sign off on every strike. He can raise objections with the Department of State in Washington, which can be forwarded to the CIA. The current ambassador as well as Secretary of State Hillary Clinton have at least one occasion raised such objections.⁸⁵ Beyond a certain point threshold, decisions are supposedly taken at the presidential level.

67. The number of deaths caused by drone attacks in Pakistan is highly disputed. Speaking on the condition of anonymity, US officials say that, according to the CIA, a total of 30 civilians have

⁷⁹ Leon E. Panetta, *Remarks of Director of Central Intelligence Agency, Leon E. Panetta, at the Pacific Council on International Policy*, 18 May 2009, <https://www.cia.gov/news-information/speeches-testimony/directors-remarks-at-pacific-council.html>.

⁸⁰ President Gerald Ford, *Executive Order 11 905*, 18 February 1976.

⁸¹ Newsweek, "Obama Administration Official Publicly Defends Drones," *Newsweek*, 26 March 2010, <http://www.newsweek.com/blogs/declassified/2010/03/26/obama-administration-official-publicly-defends-drone-attacks.html>.

⁸² Karen DeYoung and Joby Warrick, "Pakistan and US Have Tacit Deal On Airstrikes," *The Washington Post*, 16 November 2008.

⁸³ FoxNews.com, "Feinstein's Blurt Leads to US Confirmation That It Uses Pakistani Air Base," *FoxNews.com*, <http://www.foxnews.com/politics/2009/02/19/feinsteins-blurt-leads-confirmation-uses-pakistani-air-base/>.

⁸⁴ Amitai Etzioni, "The Secret Matrix," *The World Today*, vol. 66, no. 7, 2010.

⁸⁵ AP, "Timing of Drone Strike Questioned," *CBS News World*, 2 August 2011.

been killed since the programme was expanded in July 2008, including the wives and children of militants.⁸⁶ Officials suggest that this tally is based on video analysis of each attack and its aftermath, along with other intelligence. Indeed, John Brennan, the White House counter-terrorism advisor, has argued that, in the last year, “there hasn’t been a single collateral death because of the exceptional proficiency, precision of the capabilities that we’ve been able to develop.”⁸⁷ Members of Congress, briefed on these covert operations, have backed such low estimates of civilian casualties. Independent analysts claim the number is much higher, however. The New America Foundation estimates that between 293 and 471 non-combatants and a total of between 1,628 to 2,561 have died in drone strikes since 2004.⁸⁸ A widely-cited report by a Pakistani newspaper, derived from death announcements and local media reports, arrived at a smaller overall number, but a much higher proportion of civilian casualties, with 14 terrorists and roughly 700 civilians killed.⁸⁹ A key difficulty in estimating the real number is how to count. For example, US government officials include drivers and bodyguards as legitimate targets, while others do not.

68. Reactions to drone attacks within Pakistan used to be more difficult to judge, but have invariably changed to the negative this year, as US-Pakistani relations have dropped to new lows. Given that Pakistan is a country where at least 59 per cent of the population perceives the United States as the greatest threat to their nation,⁹⁰ it should not come as a surprise that, when civilians are killed erroneously, public outrage is explosive. In these cases, the Pakistani government, even though it might support parts of the air campaign, at least reluctantly - although this may have changed given the current situation - is forced to react strongly, for fear of losing support and credibility. At times, the Pakistani army has hinted at the possibility of retaliation. Although not as a result of a UAV strike, the government did, indeed, shut down NATO supply lines to Afghanistan in 2010, after a helicopter intrusion from Afghanistan left several Pakistani soldiers dead – which could happen again if US-Pakistani relations were to deteriorate further.

69. That being said, contradictory reports have, at times, come from Pakistan with regard to public sentiment on this issue. One organisation, AIRRA (Aryana Institute for Regional Research and Advocacy), conducted a survey of people living in the Federally Administered Tribal Areas (FATA), where most of the strikes take place, and reported that a majority of residents approved of the strikes because of resentment against the increased presence of armed Taliban insurgents.⁹¹ However, the validity of the results has been widely questioned and, in contrast, an *a/Jazeera/Gallup* poll found that only nine per cent of Pakistanis support the UAV raids.⁹² Another survey, conducted directly in the FATA showed that 80 per cent of the residents do not support them.⁹³ The most recent Pew poll puts the percentage of Pakistanis opposing the UAV strikes at 97 per cent.⁹⁴

⁸⁶ Ken Dilanian, “CIA Drones May Be Avoiding Pakistani Civilians,” *Los Angeles Times*, 22 February 2011.

⁸⁷ Ken Dilanian, “U.S. Counter-Terrorism Strategy to Rely On Surgical Strikes, Unmanned Drones,” *Los Angeles Times*, 29 June 2011.

⁸⁸ Dilanian, “CIA Drones May Be Avoiding Pakistani Civilians” ; and New America Foundation, *The Year of the Drone: An Analysis of US Drone Strikes in Pakistan, 2004-2011*.

⁸⁹ David Kilcullen and Andrew McDonald Exum, “Death From Above, Outrage Down Below,” *The New York Times*, 16 May 2009.

⁹⁰ Issam Ahmed, “Pakistan Likes Al Qaeda More than America,” *The Christian Science Monitor*, 30 July 2010.

⁹¹ Sam Black, “Striking the Right Balance: The Utility of Drone Attacks in AfPak,” *Huffington Post*, 4 May 2009, http://www.huffingtonpost.com/sam-black/striking-the-right-balanc_b_196463.html.

⁹² NPR, “Drone Attacks Up Along Afghan-Pakistan Border,” *NPR*, 28 September 2010, <http://www.npr.org/templates/story/story.php?storyId=130180992>.

⁹³ Al Jazeera English, “Pakistan: State of the Nation,” *Al Jazeera English*, 13 August 2009, <http://english.aljazeera.net/focus/2009/08/2009888238994769.html>.

⁹⁴ Issam Ahmed, “How Pakistani Minutemen Are Fighting the Taliban 'False Muslims',” *The Christian Science Monitor*, 1 August 2011.

70. The rationale for the US strategy of targeted killings of al-Qaeda members and other militants in Pakistan is that they contribute to disorganising and destabilising the terrorists' networks: safe havens can be disrupted, alliances are put in jeopardy, efforts geared towards self-preservation rather than attacks must be stepped up, tensions and leadership rivalries can arise in the vacuum left by killed leaders and new leaders might not be as experienced and well-trained. In fact, Dennis Blair, former US Director of National Intelligence and now a critic of the drone policy, has testified to Congress that "replacing the loss of key leaders, since 2008, in Pakistan's Federally Administered Tribal Areas has proved difficult for al-Qaeda."⁹⁵ This argument is seemingly been supported by documents found in Osama bin Laden's hideout in Abbottabad.⁹⁶ Indeed, US officials have said that of the top 30 al-Qaeda members in the Afghanistan-Pakistan region, 20 have been killed since the beginning of 2010, most of them by drone strikes.⁹⁷

71. Critics have argued that, even though drone strikes on militant leaders have had some effects on their organisations, they can never be enough, as insurgent and terrorist networks are adaptive and flexible. For example, leadership has possibly moved away from the FATA into major urban areas in other parts of Pakistan.⁹⁸ Successors to killed leaders are more likely to be even more radical and will perhaps try to prove themselves through more spectacular attacks.⁹⁹ The perception of drones as a dishonourable way of fighting could also negatively impact the hope of keeping local tribesmen neutral or friendly to the United States or the Pakistani government. In fact, local tribesmen already seem to be shifting their allegiances towards the Taliban or foreign militants because of civilian deaths in their areas.¹⁰⁰

72. It is widely acknowledged that the UAV strikes on key personnel cannot be more than one tool in the fight against terrorists and insurgent groups. Drone strikes will not break recruitment patterns, but induce intensified recruitment, which could undermine reintegration and reconciliation efforts and further destabilise an already fragile Pakistan. In Afghanistan, ISAF has a human face and aids the reconstruction of the country substantially. In Pakistan, however, US forces cannot achieve such effects, despite the fact that considerable quantities of aid are being provided to the Pakistani government, of which about USD 800 billion has either been put on hold or cut recently out of dissatisfaction with current Pakistani policies.¹⁰¹ Indeed, the US-Pakistani relationship is currently at a crossroads, in which great care has to be taken so as to not upset the strategic relationship between the two countries, which is vital to both. In sum, whether or not one agrees to the necessity of drone strikes in Pakistan, it is clear that the campaign can only be one component of the solution to counter the insurgency inside Afghanistan.

IV. CONCLUSION

73. This report has addressed two of the most significant technological aspects of the ISAF mission in Afghanistan; first, the low-tech threat posed by IEDs planted by insurgents in large parts of the country, which is the most dangerous menace to international and Afghan troops as well as Afghan civilians; and, secondly, high-tech unmanned aerial and ground systems, which have

⁹⁵ Peter Bergen and Katherine Tiedemann, "The Drone War," *The New Republic*, 3 June 2009.

⁹⁶ Greg Miller, "Bin Laden Files Show al-Qaeda Under Pressure," *The Washington Post*, 2 July 2011.

⁹⁷ Mark Landler and Helene Cooper, "Obama Will Speed Military Pullout From Afghan War," *The New York Times*, 22 June 2011.

⁹⁸ Bergen and Tiedemann, "The Drone War."

⁹⁹ David Wood, "Obama's Drone War: Does the Killing Pay Off?," *Politics Daily*, 2010, <http://www.politicsdaily.com/2010/02/12/obama-s-drone-war-does-the-killing-pay-off/>.

¹⁰⁰ Bobby Ghosh and Mark Thompson, "The CIA's Silent War in Pakistan," *Time*, 1 June 2009.

¹⁰¹ Ben Arnoldy and Issam Ahmed, "US Cuts Aid to Pakistan: Six Key Questions," *The Christian Science Monitor*, 2011.

profoundly changed the nature of the battlefield in the 21st century. Both topics deserve the continued attention of the NATO PA and will require in-depth discussions within the STC.

74. The year 2011 marks the beginning of the transition in Afghanistan. In July, complete responsibility for security was handed over to the Afghan government in the first seven areas: most of Kabul, Panjsher Province, Bamiyan Province, parts of Herat city, Lashkar Gah city, Mazar-e Sharif and Mehtarlam. The unfolding process of transition poses unique challenges to international and Afghan troops. One of them is the fact that the ANSF is not as well-trained in C-IED efforts as ISAF troops and is thus particularly vulnerable to the threat of IEDs. While some programmes are already in place, NATO and its partners should therefore step up the training of the ANSF, and indeed across the whole government structure in this regard, particularly for the forces responsible in transitioned areas. In the long term, the IED threat in the whole country must be reduced to a level that Afghan forces can manage on their own. C-IED strategy is therefore intimately tied with successful transition to Afghan-led policing and security efforts.

75. As for NATO and its coalition partners, there was a renewed impetus in their C-IED efforts in 2010. Good progress was made in co-ordinating procurement and training and in developing a strategic C-IED approach that targets networks as well as devices. The US surge, which brought over 1,000 technical personnel specialised on C-IED to the country, is beginning to be felt on the ground.¹⁰² The sharing of operational knowledge and the continued development of IED databases and attack methodology are also to be welcomed and further encouraged. Yet more can be done. Of critical importance is the funding and development of better man-portable detection devices, including smaller UGVs, to allow dismounted infantry to detect devices before they explode. In the near-term, when combined with ISAF's other C-IED efforts, this would help reduce the number of effective IEDs to a level that will allow for continued progress in efforts geared toward reconstruction and development of civil society. By reducing casualties, it will reduce the political pressure on NATO and partner nations to leave the theatre. In the medium- to long-term, NATO member states' C-IED capabilities need to make the transition from serving current urgent operational needs to their core capabilities in order to preserve the lessons learned in Iraq and Afghanistan, as IEDs will undoubtedly play a role in future operational environments.

76. UAVs have proved to be a very effective tool in counter-insurgency operations in Afghanistan. They provide considerable 'value-added' in intelligence, surveillance, target acquisition and reconnaissance for troops on the ground as well as at the strategic level. Their successful integration into the tactics of forces on the ground has been groundbreaking, and their efficiency in taking out leaders of the insurgency and infrastructure critical to their efforts is unprecedented. Nevertheless, the STC should continue to monitor the implications of this integration, as it poses a diverse range of ethical and legal questions. As to the controversial drone campaign in Pakistan, it is important that the United States meticulously follows international law and international humanitarian law. As justified, legal and efficient as these drone strikes might be, careful attention should also be paid to their effects on Pakistan's internal stability. To reiterate, the current US-Pakistani relationship is at a crucial waypoint. The relationship is strategically vital for both sides and precipitous steps by either country could have serious and deleterious effects on regional and perhaps even global security dynamics. The Rapporteur wishes to underline that he believes that continued close ties between NATO member states and Pakistan are of utmost importance to both sides.

77. UGVs are valuable in the fight against IEDs, but have generally lagged behind developments in UAV platforms. Even with regard to IEDs, many soldiers on the ground still rely more on their

¹⁰² Reid, "Counter IED Efforts Try to Get 'Left of the Boom' in Afghanistan."

minds, eyes and hands than on UGVs, in order to stay alive. The scientific and technological challenges to a true breakthrough in UGVs are great, but the STC should monitor developments closely, as the practical advantages of such vehicles are potentially large, and future avenues, such as armed UGVs, pose particularly hard questions in practice, but also in terms of ethics and legality.

78. This report has not only shown that the IED phenomenon is a crucial challenge in Afghanistan and that unmanned systems provide solutions to the needs on the ground in this theatre. Indeed, the issues touched upon in this report go far beyond current operations in the country. For one, the use of IEDs will not disappear in the near term, but will likely increase as a cheap and effective insurgent and terrorist tactic around the world. Thus, member and partner states have to preserve the capability to meet the IED challenge in the future. Furthermore, upcoming advances in science and technology will make it possible to push the boundaries of what is possible in unmanned technology. This will open new opportunities for NATO and partner nations. However, the use of unmanned systems will continue to pose difficult legal, ethical and moral questions, which require urgent, but thoughtful, deliberation and pro-active policies before real-world developments will overtake policy-making.
