

Chapter 1

A Security Culture

A. A Risk-Based Approach

Since the events of 11 September 2001, there have been several attempts against the security of aircraft in flight. These threats have ranged from shoe bombs to dirty bombs to explosives that can be assembled in flight with liquids, aerosols and gels. In every instance the global community has reacted with pre-emptive and preventive measures which prohibit any material on board which might seemingly endanger the safety of flight. Some jurisdictions have even gone to extremes in prohibiting human breast milk and prescriptive medications on board.

New and emerging threats to civil aviation are a constant cause for concern to the aviation community. Grave threats such as those posed by the carriage of dangerous pathogens on board, the use of cyber technology calculated to interfere with air navigation systems, and the misuse of man-portable air defence systems are real and have to be addressed with vigour and regularity. The International Civil Aviation Organization has been addressing these threats for some time and continues to do so on a global basis.

Since the events of 11 September 2001 took place, the most critical challenge facing international civil aviation remains to be the compelling need to ensure that the air transport industry remains continuous and its consumer is assured of sustained regular, safe and secure air transport services. The Air Transport Association (ATA), in its 2002 State of the United States Airline Industry Statement, advised that, in the United States, the combined impact of the 2001 economic downturn and the precipitous decline in air travel following the 11 September 2001 attacks on the United States resulted in devastating losses for the airline industry which are likely to exceed \$7 billion and continue through 2002.¹ Of course, the overall picture, which portended a certain inevitable gloom for the air transport industry, was not the exclusive legacy of United States' carriers. It applied

¹State of the United States Airline Industry, *A Report on Recent Trends for United States Carriers*, Air Transport Association: 2002, Statement by Carol B. Hallett, President and CEO, ATA.

worldwide, as was seen in the abrupt downfall of air traffic globally during 2001. The retaliation by the world community against terrorism, which is an ongoing feature in world affairs, increased the airline passenger's fear and reluctance to use air transport. In most instances in commercial aircraft purchasing, air carriers cancelled or postponed their new aircraft requisition orders. Many carriers, particularly in developing countries, were seen revisiting their cost structures and downsizing their human resource bases. It is incontrovertible that another similar event or series of events will inevitably plunge the aviation industry into similar despair and destitution.

In order to arrive at where we are at the present time with regard to the results of the global measures taken by the International Civil Aviation Organization (ICAO), it is necessary to discuss the various steps taken from a regulatory perspective by ICAO in its role as regulator and mentor of international civil aviation, in countering imminent threats posed to the sustainability of the air transport industry.

B. The ICAO Response

I. The ICAO High-Level Ministerial Conference

At the 33rd Session of the Assembly, held from 25 September to 5 October 2001, ICAO adopted Resolution A33-1 entitled "Declaration on misuse of civil aircraft as weapons of destruction and other terrorist acts involving civil aviation".² This Resolution, while singling out for consideration the terrorist acts which occurred in the United States on 11 September 2001, and, *inter alia*, recognizing that the new type of threat posed by terrorist organizations requires new concerted efforts and policies of cooperation on the part of States, urged all Contracting States to intensify their efforts in order to achieve the full implementation and enforcement of the multilateral conventions on aviation security, as well as of the ICAO Standards and Recommended Practices and Procedures (SARPs) relating to aviation security, to monitor such implementation, and to take within their territories appropriate additional security measures commensurate to the level of threat in order to prevent and eradicate terrorist acts involving civil aviation. The Resolution also urged all Contracting States to make contributions in the form of financial or human resources to ICAO's aviation security mechanism to support and strengthen the combat against terrorism and unlawful interference in civil aviation; called on Contracting States to agree on special funding for urgent action by ICAO in the field of aviation security; and directed the Council to develop proposals and take

²*Assembly Resolutions in Force* (as of 5 October 2001), ICAO Doc 9790, at p. VII-1. Also of general interest is UN General Assembly Resolution 56/88, *Measures to Eliminate International Terrorism*, adopted at the 56th Session of the United Nations which calls upon States to take every possible measure in eliminating international terrorism. See A/RES/56/88, 24 January 2002.

appropriate decisions for a more stable funding of ICAO action in the field of aviation security, including appropriate remedial action.

Resolution A33-1 also directed the Council to convene, at the earliest date, an international high-level, ministerial conference on aviation security in Montreal with the objectives of preventing, combating and eradicating acts of terrorism involving civil aviation; of strengthening ICAO's role in the adoption of SARPs in the field of security and the audit of their implementation; and of ensuring the necessary financial means to strengthen ICAO's AVSEC Mechanism, while providing special funding for urgent action by ICAO in the field of aviation security.

On 19 and 20 February 2002, in keeping with the requirement of Assembly Resolution A33-a high level ministerial conference on aviation security was held in the Headquarters of the International Civil Aviation Organization, Montreal. In the words of Dr. Assad Kotaite, President of the ICAO Council who opened the Conference (and later served as the Chairman of the Conference), the Conference was being held "...at a critical juncture for civil aviation and for society at large ... and would review and develop global strategy for strengthening aviation security with the aim of protecting lives both in the air and on the ground, restoring public confidence in air travel and promoting the health of air transport in order that it can renew its vital contribution to the world economy..."³ Dr. Kotaite stated that this was a historic moment in the evolution of civil aviation.

At this Conference, attended by Member States of the International Civil Aviation Organization, Some 714 participants from 154 Contracting States and observers from 24 international civil aviation organizations endorsed a global strategy for strengthening aviation security worldwide and issued a public declaration at the conclusion of their two-day meeting.

The High Level Ministerial Conference came to several conclusions and adopted numerous recommendations containing guidance for follow up action. The Conference concluded that the events of 11 September 2001 have had a major negative impact on world economies and an impact on air transport which is unparalleled in history and restoration of consumer confidence in air transport and assurance of the long-term health of the air transport industry are both vital, and many States have already initiated a range of measures to this effect. It was also the view of the Conference that the effective application of enhanced uniform security measures, commensurate with the threat, will help to restore confidence in air transport, but these measures will need to be passenger and cargo user-friendly and not overly costly for the industry and its consumers if traffic growth is to be regenerated. Accordingly, the Conference recommended that consistent with Assembly Resolution A33-1, States should intensify their efforts to achieve the full implementation and enforcement of the multilateral conventions on aviation security as well as of the ICAO Standards and Recommended Practices (SARPs) relating to aviation security and take within their territories appropriate additional security measures

³ICAO News Release *PIO 02/2002*.

which are commensurate with the level of threat and are cost effective. Since restoration of confidence in air transport is a collective responsibility, the Conference called upon States to enhance international cooperation in aviation security and assist developing countries to the extent possible.

With regard to the compelling need to strengthen aviation security worldwide, the Conference concluded that a strong and viable aviation security (AVSEC) programme was indispensable and that a global uniform approach to the implementation of the international aviation security standards is essential, while leaving room for operational flexibility. It was also considered useful to establish regional and sub-regional approaches which could make a significant contribution to ICAO's aviation security activities. The Conference concluded that aviation security was a responsibility of Contracting States, and States which outsource aviation security programmes should therefore ensure that adequate governmental control and supervision are in place. The Conference also observed that, since gaps and inadequacies appear to exist in international aviation security instruments with regard to new and emerging threats to civil aviation, further study was needed in this regard. There was a need for a comprehensive ICAO *Aviation Security Plan of Action* for strengthening aviation security, through a reinforced AVSEC mechanism, an ICAO aviation security audit programme, technical cooperation projects, promotion of aviation security quality control functions and appropriate performance indicators.

Based on the above conclusions the Conference recommended that States take immediate action to lock flight deck doors for aircraft operated internationally, while maintaining measures on the ground to provide the highest level of aviation security. States were also requested to actively share threat information in accordance with Standards in Annex 17 and employ suitable threat assessment and risk management methodologies appropriate to their circumstances, based on a template to be developed by ICAO and ensure that aviation security measures are implemented in an objective and non-discriminatory manner.

As for ICAO's role in this process, the Conference recommended that the Organization develop, as a matter of high priority, amendments to the appropriate Annexes to require protection of the flight deck door from forcible intrusion; continue its efforts to identify and analyze the new and emerging threats to civil aviation with the purpose of assisting in the development of security measures and to actively collaborate with other associated agencies; carry out a detailed study of the adequacy of the existing aviation security conventions and other aviation security-related documentation with a view to proposing and developing measures to close the existing gaps and remove the inadequacies, including amendment where required, so as to deal effectively with the existing, as well as the new and emerging, threats to international civil aviation; develop and take action to deal with the problem of aviation war risk insurance; and develop and implement a comprehensive *Aviation Security Plan of Action* and any additional actions approved by the Council, including a clear identification of priorities.

One of the key conclusions of the Conference was that, in order to further enhance safety and security and to ensure the systematic implementation of the

critical elements of a State's aviation security system, there was an urgent need for a comprehensive ICAO programme of aviation security audits and that such a programme should audit national level and airport level compliance with Annex 17 and with aviation security related provisions of other Annexes on a regular, mandatory, systematic and harmonized basis. It was the view of the Conference that the ability to determine whether an airport or State is in compliance will require that auditors have a solid aviation security background and be sufficiently trained and certified by ICAO to ensure that auditing is conducted in a consistent and objective manner. The Conference was strongly convinced that such an audit programme should be undertaken under the auspices of ICAO's AVSEC Mechanism which could be guided by proven and successful concepts used in viable programmes already developed by the European Civil Aviation Conference (ECAC), the United States and other States in the development of the framework for a security audit programme.

It was considered that the regional approach would have many benefits and was to be considered as supplementary to local initiatives, in particular by promoting regional partnership and the activities of the ICAO Regional AVSEC Training Centres. The AVSEC Panel, which is an instrumentality of the ICAO Council should assist in the development of technical requirements and guidance materials needed to administer the audits and assist in the development of an effective quality assurance programme to maintain standards of audit performance; and since an audit programme could provide only security levels of audited airports at the time of the audit, a permanent mechanism based on quality control and the regular conduct of exercises and inspections could guarantee the continuity and improvement of security levels determined by the audits.

Arguably, the most significant and seminal recommendation of the Conference was that ICAO establish a comprehensive programme of a universal, regular, mandatory, systematic and harmonized aviation security audits, with implementation beginning in 2003 based on the final work plan established by the Council. It was also decided that, in order to be effective, the programme should be based on an audit process that uses ICAO trained and certified audit teams which are headed by an ICAO staff member and which consistently apply fair and objective methods to determine compliance with Annex 17 by observing measures at airports and assessing the State's capabilities to sustain those measures.

The Conference was of the view that of singular importance to the audit process was the need for the audit programme to be established under the auspices of ICAO's AVSEC Mechanism. It recommended that, in developing the audit programme, which should be transparent and autonomous, ICAO should ensure the greatest possible coordination and coherence with audit programmes already established at a regional or sub-regional level, taking into account aviation security situation in these States. For this to be a reality, a compliance mechanism has to be built into the programme, which will delineate between minor and serious areas of improvement, ensure that immediate corrective action is taken for serious deficiencies and provide to developing States the necessary assistance to measurably improve security.

With regard to funding an aviation security audit programme to be run by ICAO, an adequate and stable source of funding was to be sought for the AVSEC Mechanism through increased voluntary contributions until such time that an allocation of funds can be sought through the Regular Programme Budget, which was envisioned to be as soon as possible. It was recommended that all States be notified of a completed audit, that ICAO Headquarters be the repository for full audit reports and that the sharing of audit reports between States take place on a bilateral or multilateral basis. States were required, under such a programme, to commit to provide ICAO with national AVSEC findings based on a harmonized procedure to be developed by ICAO as early as possible. Of course, those States – in particular developing countries – should be provided with technical and financial assistance under technical cooperation, so that they may take remedial actions to rectify the deficiencies identified during the audit. States should also utilize the ICAO audits to the maximum extent possible and could always approach ICAO with regard to the audit findings for other States.

The Conference also concluded that, in order to execute the ICAO *Aviation Security Plan of Action*, an indicative additional funding requirement was for a minimum of US \$15.4 million through voluntary contributions for the current triennium 2002–2003–2004, these figures to be used as a basis for further study by the Council. However, for the longer term a more stable means of funding the ICAO *Aviation Security Plan of Action* would be either through an increase of the assessment to the ICAO General Fund for the following triennia, or by a long-term commitment, on a voluntary basis, of systematic contributions according to an approved suggested level of contribution, to be determined by the Council, by all States. With regard to recouping policies of States, the Conference observed and confirmed that ICAO's policy and guidance material on cost recovery of security services at airports in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082/6) and the *Airport Economics Manual* (Doc 9562) remained valid, although there was a need for development of additional policy and guidance material on cost recovery of security measures with regard to air navigation services complementary to that which already exists with respect to airport security charges. There was also a need for further improvement of human resources, utilizing the existing training centres and the standardization of instruction materials, where appropriate based on ICAO's TRAINAIR methodology.

On the above basis, States were called upon by the Conference to commit to provide adequate resources, financial, human and/or otherwise in kind, for the time being on a voluntary basis through the AVSEC Mechanism, for the ICAO *Aviation Security Plan of Action* for the triennium 2002–2003–2004 as a matter of priority, and be aware of the continuing needs for subsequent triennia. They were also called upon to agree to remove the existing ties they individually imposed on the expenditures of AVSEC Mechanism contributions in order for ICAO to immediately utilize all funds available in the AVSEC Mechanism Trust Funds. The Conference observed that States might wish to use the Technical Co-operation Programme of ICAO as one of the main instruments to obtain assistance in advancing implementation of their obligations under relevant international conventions, Standards and

Recommended Practices (SARPs) of Annex 17 – *Security* and related provisions of other Annexes, as well as adherence to ICAO guidance material.

As for ICAO’s involvement and contribution, the Organization was requested to establish an ICAO *Aviation Security Follow-up Programme* and seek additional resources, similar to the USOAP Follow-up Programme of the Technical Co-operation Bureau, to enable States to obtain technical cooperation in the preparation of necessary documentation and in resource mobilization for aviation security. It was felt that one of the ways in which this could be achieved was by ICAO promoting the use of the ICAO Objectives Implementation Mechanism as a means for States to obtain technical cooperation, as required for the rectification of deficiencies identified during aviation security evaluations and audits and urgently pursuing the development and implementation of an International Financial Facility for Aviation Safety (IFFAS),⁴ to encompass not only safety but also security. Another significant function of ICAO was to elaborate on its policy and guidance material on cost recovery of security services, notably to include development of policy and guidance material on cost recovery, through charges, of security measures with regard to air navigation services and explore the issue of using security charges as a means of recovering the cost of ICAO assistance when it is provided to States for security development projects.

II. Post Conference Work

In furtherance to the recommendations of the Conference, the ICAO Secretariat initiated an aviation security plan of action which was aimed at reviewing legal instruments, in particular the enhancement of Annex 17 – *Security – Safeguarding International Civil Aviation against Acts of Unlawful Interference* to the Convention on International Civil Aviation (the work undertaken by the AVSEC Panel and the latest Amendment 10 to Annex 17) and introduction or strengthening of security-related provisions in other Annexes to the Convention (Annex 1 – *Personnel Licensing*, Annex 6 – *Operation of Aircraft*, Annex 8 – *Airworthiness of Aircraft*, Annex 9 – *Facilitation*, Annex 11 – *Air Traffic Services*, Annex 14 – *Aerodromes* and Annex 18 – *The Safe Transport of Dangerous Goods by Air*). The plan of action also envisioned reinforcing AVSEC Mechanism activities, notably in the preparation of security audits and in undertaking immediate/urgent assistance to States, and expediting work on improving technical specifications relating to and further implementing the use of Machine Readable Travel Documents (MRTDs), biometric identification and travel document security and improving border security systems. The reviewing of certain Procedures for Air Navigation Services (PANS) and revision of relevant ICAO manuals and other guidance

⁴For detailed information on the proposed International Financial Facility for Aviation Safety, see, Abeyratne (2000, pp. 383–407).

material including further development of Aviation Security Training Packages (ASTPs), training programmes, workshops, seminars, as well as assistance to States through ICAO's technical co-operation programme are also on the programme of implementation.

At that time, ICAO considered the development and execution of a comprehensive and integrated ICAO AVSEC Plan of Action as its highest priority. It is no less important to ICAO at the present time. The success of this Plan of Action was to be measured over a long period as the improvements expected in Contracting States would require an intensive and continuous worldwide commitment. It was expected that the full and active participation of all Contracting States, as well as all technical and deliberative bodies of ICAO, was essential for the achievement of concrete results within an acceptable period of time.

The aviation security plan of action of ICAO was to focus on the development of new training and guidance material on National Quality Control (NQC), System Testing, Auditors, audit guidelines and forms, including urgent distribution to all States, including training and certification of international auditors through the existing ICAO Aviation Security Training Centres (ASTCs) network, which was to be reinforced and expanded where required. It was also expected to include undertaking universal, mandatory and regular AVSEC audits to assess the level of implementation and enforcement by States of SARPs contained in Annex 17, together with the assessment of security measures undertaken and, on a sample basis, at airport level for each State. ICAO would maintain an ICAO AVSEC findings database would be maintained. The creation of Aviation Security Regional Units (ASRUs) functionally linked to the AVSEC Mechanism, to be urgently implemented in Africa, the Middle East, Eastern Europe, the Americas and Asia and Pacific, in order to coordinate the execution of AVSEC Mechanism activities and provide direct assistance to States was also a feature of the plan.

The seminal consideration regarding ICAO's role in sustaining the aviation industry lies in the mandate of the Organization, as contained in Article 44 of the Convention on International Civil Aviation.⁵ In this context, ICAO's role throughout the past 63 years has been one of adapting to the trends as civil aviation went through three distinct phases of metamorphosis. The first phase was the modernist era as it prevailed when the Convention on International Civil Aviation was signed at Chicago on 7 December 1944, which was centred on State sovereignty⁶ and the widely accepted post-war view that the development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to general security.⁷ This essentially modernist philosophy focussed on the importance of the

⁵Convention on International Civil Aviation (also called the Chicago Convention), signed at Chicago on 7 December 1944. See ICAO doc 7300/9 Ninth Edition, 2006.

⁶Article 1 of the Chicago Convention provides that the Contracting States recognize that every State has complete and exclusive sovereignty over airspace above its territory.

⁷Preamble to the Chicago Convention.

State as the ultimate sovereign authority which can overrule considerations of international community welfare if they clashed with the domestic interests of the State. It gave way, in the 1960s and 1970s to a post-modernist era of recognition of the individual as a global citizen whose interests at public international law were considered paramount over considerations of individual State interests.

The 11 September 2001 events led to a new era that now calls for a neo-post modernist approach. This approach, as has been demonstrably seen after the occurrence of the events of 11 September 2001, admits of social elements and corporate interests being involved with States in an overall effort at securing world peace and security. The role of ICAO in this process is critical, since the Organization is charged with regulating for safe and economic air transportation within the broad parameters of the air transport industry. The industry remains an integral element of commercial and social interactivity and a tool that could be used by the world community to forge closer interactivity between the people of the world.

In the above sense, ICAO's initiatives in the fields of aviation security in the immediate aftermath of the 9/11 events have not been mere reactive responses but a visionary striving to ensure the future sustainability of the industry. Of course, this responsibility should not devolve upon ICAO alone. ICAO's regulatory responsibility can only be fulfilled through active regulatory participation by States.

C. Emerging Threats

I. Probability

Blaise Pascal, in his book *Ars Cogitandi* states that fear of harm ought to be proportional not merely to the gravity of the harm but also to the probability of the event.⁸ It is also a fact of risk management that, under similar conditions, the occurrence (or non-occurrence) of an event in the future will follow the same pattern as was observed in the past.⁹ Based on these premises one is confronted with the terrifying possibility that there could be a nuclear 9/11 sometime in the future.¹⁰

In the 1919 decision of *Schenk v. US*,¹¹ Justice Oliver Wendell Holmes used the words *clear and present danger* when the US Supreme Court adjudicated the case of Charles Schenk who had distributed leaflets allegedly calculated to incite and cause insubordination and obstruction in recruits of the American Socialist Party.

⁸Ferguson (2008, p. 188).

⁹Ferguson (2008, p. 188).

¹⁰Bobbitt (2008, p. 98–179).

¹¹249 US 47 (1919).

The actions of Schenk were considered to constitute an offence under the *Espionage Act* of 1917. Justice Holmes stated:

The question in every case is whether the words used are used in such circumstances and are of such a nature as to create a clear and present danger that they will bring about the substantive evils that Congress has a right to prevent. It is a question of proximity and degree. When a nation is at war many things that might be said in times of peace are such a hindrance to its effort that their utterance will not be endured so long as men fight and that no court could regard them as protected by any constitutional right.¹²

One commentator¹³ is of the view that the words *clear and present danger* have come to mean that arguably, in times of emergency, usually operative legal norms may be disregarded. Implicit in this statement is the axiom *Necessitat non habet legem* (necessity has no law). The moral foundation of Justice Holmes' statement brings to bear the philosophical discourse of justification in responding to threats. This in turn revolves round the basic consideration as to what the greater harm is: application of the legal principles to the letter; or suspending them to prevent an evil greater than the disregard of the law.

II. *Reacting to Probability*

In every instance of terrorism the focus revolves round those who are harmed by such acts. Therefore, it is difficult not to discuss the merits and demerits of strategy that would bring about the least damage based on a balance of probability. At one of my classes on international law I asked the students "suppose you are law enforcers and you have clear evidence that a certain person will plan and carryout a bomb attack that would kill an entire village in your jurisdiction, and suppose you know that if you apprehend him, there is a danger of many innocent bystanders being killed, would you go ahead and apprehend him?"

We were in the process of discussing the right of a country to exercise self defence against a possible armed attack. In particular, my class was discussing the fact that international law allows, by virtue of Article 51 of the United Nations Charter, a State to defend itself against an armed attack that occurs against its territory and people, while the attack occurs. This prohibition implicitly precludes pre-emptive or preventive attacks on an aggressor based on evidence gathered beforehand.

The United Nations High Level Panel on Threat, Challenges and Change, issued in December 2004 a report which acknowledged that a threatened State can take necessary action as long as the threatened attack is imminent, no other means would deflect it and the action taken to respond to the threat is proportionate. This statement recognizes that the right of self defence extends beyond an actual attack to an imminently threatened one, provided there is credible evidence of such a threat and the threatened State has no obviously alternative recourse available.

¹²249 US 47 (1919), 54.

¹³Keith (2005, pp. 185–196).

Built into my question was the issue of collateral damage, or as we lawyers call it *the law of unidentified consequences*. A case in point is the 2002 targeted killing of a military wing leader of Hamas who was known to be planning and ordering numerous successful bombings against civilians. He was also known to have been planning attacks that were unprecedented in size and consequences. In the process, he was using young children as human shields to carry out suicide attacks against Israel. The Israelis believed that killing the Hamas military leader would thwart the planned attacks and save hundreds of innocent lives. The difficulty in killing this terrorist was that he was constantly changing his living quarters. Often his wife slept beside him, exposing herself, an “uninvolved” person, to the possibility of being killed in an attack against the terrorist. The decision was therefore taken to order a hit only when the terrorist was alone. In one instance, a strike was called off when it was discovered he was with family members. However, when the strike was eventually carried out, the rocket killed not only the terrorist but also his wife, 14-year-old daughter and several others. Israel later issued a statement saying that if they had known the strike action would have resulted in collateral damage the attack would never have taken place.

The law of unidentified consequences dictates that under no circumstances should innocent bystanders be adversely affected intentionally. At this point, I added a new dimension to my question and asked my class: “suppose in killing the terrorist you have no alternative but to kill his 8-year-old daughter first, whom you know he will use as a human shield while carrying out his attack and this is the only opportunity you will get to save hundreds of lives. How would you weigh the one innocent life against hundreds of others?”

Alan Dershowitz, Professor at Harvard Law School and leading criminal lawyer and constitutional scholar, asks the question differently. In the context of the Holocaust of the Second World War, Dershowitz asks: “what if the Jewish Underground had credibly believed that by blowing up German Kindergartens in Berlin, they could force the closure of death camps – that the killing of a hundred innocent German children could save the lives of one million innocent Jewish children and adults, would this be a morally permissible choice of evils?”¹⁴ It will not be difficult to surmise that most people, in considering this dilemma, will agree that the wilful killing of innocent people crosses a certain moral line that should be crossed, if ever, in the most extreme and compelling circumstances.

The same question was asked by Fyodor Dostoyevski in his monumental work *The Brothers Karamazov* where one brother (Ivan) asks the other (Alyosha) whether the latter would, if it were in his power, build an edifice of human destiny that brings happiness to all mankind, but for that he must inevitably and unavoidably torture just one tiny creature, a child and build the edifice upon the unrequited tears of that child. Alyosha vehemently says he will not agree to such a condition.

In theory and in fiction, Alyosha’s position is both noble and admirable. However, it becomes a legislative nightmare when put into practice. In his book

¹⁴Dershowitz (2006, p. 26).

Dershowitz, with his characteristic intellectual dexterity, offers guidance for the development of an appropriate jurisprudence for the international community to follow with regard to pre-emptive action. But first, commonsense would dictate that one consider the uncanny pliability of the English language in identifying two types of strikes against terrorism: Preventive strikes; and pre-emptive strikes. The first characterises a strike against an aggressor who is likely to attack sometime in the future. A Pre-emptive strike on the other hand responds to circumstances that already show action taken toward launching an attack.

An example for a pre-emptive strike is the six day war launched by Israel against Egypt and Syria in 1967. The Israeli attack took place after Egypt and Syria had already closed the Strait of Tiran, expelled United Nations plenipotentiaries, massed their regular armies on the order and threatened a genocidal war. Israeli attacked pre-emptively, destroying Egyptian and Syrian forces on the ground and went onto to carve out a comprehensive and decisive victory in just six days. In this sense, it is arguable along similar lines whether the United States action in Afghanistan can be termed “preventive or pre-emptive” in removing the threat of further action on the United States after the events of 11 September 2001. The preventive part of United States action would have been to remove the ruling government which was allegedly harbouring those who could cause further harm to the United States.

Be that as it may, the words “preventive” and “pre-emptive” are unique to the English language where they are used in separate contexts while most other languages use the words inter-changeably. The result is that an explicit distinction between the two words could often be tenuous.

Certain circumstances over the past decade has made the world more cautious, leading it to guide its philosophy of mutual trust along a path which is now called “the precautionary approach”. The world would no longer sit and wait, reacting only when a crisis causes massive human suffering and loss of lives. A new doctrine, propounded by a group of scholars at the behest of the United Nations Secretary General Kofi Annan in 2001 has come into being. Called “the responsibility to protect”, this doctrine embraces the principle that all member States of the United Nations have a responsibility to protect the lives, liberty and basic human rights of their citizens, and that if they fail or are unable to carry it out, the international community has a responsibility to step in.

All this is well and good. But it does not give me an answer to my question on *the law of identified consequences* – the same question posed by Dershowitz and Dostoyevski. Can we sacrifice one known innocent person to save the lives of a hundred unknown innocent humans? This is where I go back sheepishly to my undergraduate law class on Jurisprudence. I am bound to find in my third year law notes that Bentham, one of the most influential utilitarians, who argued that the right act or policy was that which would cause “the greatest happiness of the greatest number” might have favored sacrificing an innocent life to save more lives, and that Kant, with his categorical imperative as the central philosophical concept of his moral beliefs – that human beings occupy a special place in creation and that morality can be summed up in one, ultimate commandment of reason, or

imperative, from which all duties and obligations derive, might have totally rejected the idea of sacrificing even one innocent life.

Thomas Hobbes, on the other hand, is an enigmatic source on this issue. His philosophy, found in his *Leviathan*, is, “do not that to another, which thou wouldst not have done to thyself”. Does he mean, do not sacrifice the innocent child as you would not like to be sacrificed in a similar manner? Or would he say, as he has, that a human’s primary right is self defense against a violent death and because man is constantly at war and his life is “Solitary, poor, nasty, brutish and short, one human sacrifice could be natural consequence of the exercise of self defense?”

III. Deterrence

Studies have shown that stringent measures, when adopted against a particular type of crime belonging to a generic group (such as hijacking in the spectrum of unlawful interference against civil aviation) would be effective enough to reduce that particular type of crime. However, it might give rise to increase in other forms of crime belonging to that generic group. Called the *displacement theory*, this pattern has applied in particular to civil aviation, as seen in the decrease in offences against aircraft after the events of 11 September 2001.

In order that basic strategies are employed for preventing crime and to combat crime when prevention is impossible, crime prevention strategies adopt two methods of combating crime. The first method is to prevent or stop potential criminal acts. The second method is to apprehend and punish anyone who commits a criminal act. These methods follow the philosophy that the prevention of crime can be achieved by increasing the probability of apprehension and applying severe penal sanction to a crime. For example, installation of metal detectors at airports increases the probability of detecting and apprehending potential hijackers or saboteurs. Theoretically the high risk of being apprehended decreases the potential threat and the stringent penal sanction that may apply consequent to such apprehension compound the ominous quality of the preventive means taken.

Many studies focus on aspects of the deterrence theory with the application of the theory to the varied effects of criminology applications on various modes of crimes. These studies relating to the prevention of crime attracted interesting conclusions which went on to reflect that increasing certainty and the severity of punishment reduced the rate of homicide in the United States. It was found by one study that the effect of severity was greater than that of certainty. There were negative correlations between certainty of imprisonment and total felonies. Another observation was that increasing certainty of punishment decreased the incidence of homicide, robbery, assault, burglary, larceny and auto theft. It was also found that certainty appeared to have an independent effect separate from severity of punishment. In view of the fact that effects of severity decreased as certainty of punishment decreased, it would be reasonable to conclude that it is better for policy to concentrate on increasing certainty in order that such an approach would be more effective.

The application of the above approach within U.S. resulted in an increased number of police on patrol, which resulted in a decrease in the number of robberies in New York City subways. Also, increasing the number of police on patrol decreased the number of outdoor felonies in the Twentieth Precinct of New York. Increasing the certainty and severity of punishment for drunk driving has similarly been effective in reducing drunk driving.

Generally, these studies support the hypothesis that two factors lead a criminal to perceive a greater risk of punishment. These factors are: first, certainty, or a high probability of being arrested and convicted, second, the severity of harshness of the punishment. Certainty and severity of punishment each have an individual effect on crime prevention; but there is a greater impact when certainty and severity are combined.

Deterrence as a theoretical concept that can be applied in most instances of criminology with practical results is based on the basic assumption that individuals are rational beings. Rationality promotes benefit maximizing behaviour that appears to human beings even against constraints. This means that individuals as rational beings pursue their maximizing goals by making the best choices they can. The underlying concept of the deterrence theory supports the hypothesis that rationalists consider potential criminals as rational decision-makers faced with constraints and uncertainty in their decision making process. The explanation of governmental actions follows the same pattern of the rational model. Therefore, an analyst could conclude that criminals and governmental officials are engaged in a "game" where criminals try to maximize their illegitimate goals through the "least expensive" (apprehension and punishment) approaches and governmental policy makers try to prevent crimes by increasing the probability of apprehension and creating a punishment measure which will serve as a deterrent.

The model that when other variables are held constant, an increase in the person's probability of conviction would decrease the number of offences he or she commits was first introduced in 1968, where a model was developed based on an individual's participation in criminal activity. This theory holds the view that changing the probability of conviction (certainty) has a greater effect on the number of offences than a change in punishment (severity).

In 1973, a formulation of a more comprehensive model of the decision to engage in unlawful activities, based on available empirical evidence, tested the earlier theory and revealed that the rate of specific felonies was positively related to estimates of relative gains, and negatively related to estimates of costs associated with criminal activity. One wonders, however, what the effect would be of the above findings on a criminal who does not intend living after the perpetration of the crime.

IV. Problems of Deterrence

The only deterrence that would be effective against terrorism of any nature is broadly based on the success of convincing the terrorist that the risk he takes

outweighs the benefits which may accrue to his cause by his act. The futility of attempting to wipe out terrorism by the use of military force or the threat of general sanction on an international level is apparent. The terrorist has to be shown that any attempt at terrorist activity would cause him and his cause more harm than good. Deterrence in this context attains fruition when effective punitive sanctions are prescribed and carried out whilst simultaneously denying the terrorist his demands. In both instances the measures taken should be imperatively effective. It is not sufficient if such measures are merely entered into the statute books of a State or incorporated into international treaty. The international community has to be convinced that such measures are forceful and capable of being carried out.

However, deterrence does not stop at the mere imposition of effective sanction nor does it complete its task by the denial of terrorist demands. Arguably, the most effective method of countering terrorism is psychological warfare. The terrorist himself depends heavily on psychology. His main task is to polarize the people and the establishment. He wants popular support and a sympathetic ear. He wants a lot of people listening and watching, not a lot of people dead. Counter measures taken against a terrorist attack, be it hostage taking, kidnapping or a threat of murder, should essentially include an effective campaign to destroy the terrorist's credibility and sincerity in the eyes of the public. Always, the loyalty of the public should be won over by the target and not by the terrorist. It is only then that the terrorist's risk outweighs the benefits he obtains. To achieve this objective it must be ensured that the terrorist receives publicity detrimental to him, showing the public that if the threatened person, group of persons or State comes to harm, the terrorist alone is responsible. Therefore, the most practical measures that could be adopted to deter the spread of terrorism can be accommodated in two chronological stages:

- (1) Measures taken before the commission of an offence such as the effective imposition and carrying out of sanctions and the refusal to readily comply with the demands of the terrorist
- (2) Measures taken after the commission of the act such as the skilful use of the media to destroy the credibility of the terrorist cause and to convince the people that the responsibility for the act devolves at all stages solely upon the terrorist

One difficulty in exercising deterrence against terrorism in general and international terrorism in particular is that often, the measures taken are not effective enough to convince the terrorist that in the end, more harm would be caused to him than good. Negotiation with the terrorist in particular has to be done by professionals specially trained for the task. *A fortiori*, the media has to be handled by specialists with experience. Things would be much more difficult for the terrorist if these were done. The greatest problem of deterrence is the pusillanimity of the international community in the face of terrorism and the feeble response offered by States as a composite body. The reasons for this hesitation on the part of the international community to adopt effective measures against international terrorism is by no means inexplicable. When one State supports a revolutionary cause which is aimed against another, it is quite natural that the terrorist is aware of the support

he is capable of obtaining from at least one part of the already polarized world. Therein lies the problem.

V. *Threat Assessment in ICAO*

It is incontrovertible that the underlying philosophical enigma involving the spectre of potential collateral damage should not stop the international community from reacting to terrorism. This is particularly so in civil aviation where weapons of mass destruction accounted for 1,993 lives in the Twin Towers on 11 September 2001 and the threat of a similar repeat offence has not entirely disappeared. Against this backdrop, the three grave and emerging threats to civil aviation are bioterrorism, cyber-terrorism and the misuse of shoulder launched surface to air missiles.¹⁵

At its 33rd session held in Montreal from 25 September – 5 October 2001, the ICAO¹⁶ Assembly adopted Resolution A33-1¹⁷ which was a direct response to the terrorist acts of 9/11. The Resolution recognized that a new type of threat was posed to civil aviation which required new concerted efforts and policies of cooperation on the part of States. The Resolution also urges all ICAO member States to ensure, in accordance with Article 4 of the Chicago Convention,¹⁸ that civil aviation is not used for any purpose inconsistent with the aims of the Convention, and to hold accountable and punish severely those who misuse civil aircraft as weapons of destruction, including those responsible for planning and organizing such acts or for aiding, supporting or harbouring perpetrators. It also called upon States to cooperate with each other in this endeavour and to ensure that ICAO Standards and Recommended Practices (SARPs) relating to aviation security are adhered to.

¹⁵There is also a new dimension in the sabotage of aviation which results in damage caused by the hostile use of dirty bombs, electromagnetic pulse devices or biochemical materials. Dirty bombs are devices which cause damage through nuclear detonation involving the spread of radioactivity to undetermined areas. This article will not address this threat. However, for a detailed discussion on this threat see Abeyratne (2005, pp. 117–129).

¹⁶The International Civil Aviation Organization, a specialized agency of the United Nations, was established by Article 44 of the *Convention on International Civil Aviation* (Chicago Convention), signed at Chicago on 7 December 1944 (ICAO Doc 7300/9, Ninth Edition, 2006). The main objectives of ICAO are to develop the principles and techniques of international air navigation and to foster the planning and development of air transport. ICAO has 190 Contracting States. ICAO's Mission and Vision Statement is "to achieve its mission of safe, secure and sustainable development of civil aviation through cooperation amongst its member States". In December 2004, following a decision by the 35th Session of the ICAO Assembly, the Council of ICAO approved six Strategic Objectives for 2005–2010: They are: safety; security; environmental protection; efficiency; continuity; and rule of law. The Strategic Objective applicable to this article is security.

¹⁷Resolution A33-1, Declaration on misuse of civil aircraft as weapons of destruction and other terrorist acts involving civil aviation, Assembly Resolutions in Force (as of 8 October 2004) ICAO Doc. 9848. at VII-1.

¹⁸Convention on International Civil Aviation, signed at Chicago on 7 December 1944. See ICAO Doc 7300/9 Ninth Edition 2006.

Finally the Resolution directed the Council of ICAO and the Secretary General to act urgently to address new and emerging threats to civil aviation, in particular to review the adequacy of existing aviation conventions on security.

In response to the requirement of A33-1, that ICAO act with some urgency to address new and emerging threats to civil aviation, an ICAO Special Sub Committee meeting of the Legal Committee on the subject of preparation of one or more instruments addressing new and emerging threats was held at ICAO Headquarters from 3 to 6 July 2007.¹⁹ At this meeting, Australia submitted a proposal²⁰ to prohibit the intentional and unlawful transport by air of particularly dangerous goods and fugitives. In this paper, Australia quoted the Preamble²¹ to the Chicago Convention and emphasized that ICAO was created to help ensure the safe and orderly growth of civil aviation and to encourage the operation of civil aircraft for peaceful purposes. It was also the view of Australia that there were gaps in the international legal framework with regard to the unlawful transport of biological, chemical and legal weapons and other dangerous material on board civil aircraft and that the international aviation community had a responsibility to address these lacunae and shortcomings, particularly when an opportunity such as the one presented through the ICAO meeting arose.

The Sub Committee meeting had the opportunity, through the Australian paper, to note other international legislation on the transportation of dangerous materials. For example, the 2005 Protocol to the Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation which underscores the extreme danger of use by unlawful activity of maritime transport of nuclear, chemical or biological weapons.²² Additionally, there are other guidance material, such as those issued by the World Health Organization²³ which provide practical guidance to facilitate compliance with current international regulations for the transport of

¹⁹One of the terms of reference of the Sub Committee as agreed by the ICAO Council was: to prepare, in light of A33-1 and the guidance of the Council, one or more draft instruments addressing the new and emerging threats to civil aviation. See Special Sub Committee on the Preparation of One or More Instruments Addressing New and Emerging Threats, Introductory Note, *LC/SC-NET-WP/1*, 29/05/07 at p. 2.

²⁰Proposal to Prohibit the International and Unlawful Transport by Air of Particularly Dangerous Goods and Fugitives, *LC/SC-NET-WP/3*, 5/07/07.

²¹The Preamble to the Chicago Convention recognizes that the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the world, and yet its abuse can become a threat to the general security. It also states that it is desirable to avoid friction and to promote co-operation between nations and peoples upon which the peace of the world depends. In pursuance of these objectives, governments signed the Convention that contains certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically.

²²United Nations (2009, p. 1–2).

²³Guidance on Regulation for the Transport of Infectious Substances, World Health Organization, September 2005, WHO/CDS/CSR/LYO/2005.22.

infectious substances²⁴ and patient specimens by all modes of transport, both nationally and internationally, and include the changes that apply from 1 January 2005.²⁵ The WHO regulations categorically state that The *Technical Instructions for the Safe Transport of Dangerous Goods by Air* published by ICAO are the legally binding international regulations.²⁶ IATA *Dangerous Goods Regulations* (DGR) that incorporate the ICAO provisions and may add further restrictions (where necessary such restrictions are included in these guidelines). The ICAO rules apply on all international flights. For national flights, i.e. flights within one country, national civil aviation authorities apply national legislation. This is normally based on the ICAO provisions, but may incorporate variations. State and operator variations are published in the ICAO Technical Instructions and in the IATA Dangerous Goods Regulations. The WHO guidelines also contain detailed packing instructions regarding infectious substances.²⁷

A Special Sub Committee of the Legal Committee of ICAO met in Montreal from 3 to 6 July 2007 to discuss the preparation of one or more instruments addressing new and emerging threats. One of the issues addressed at this meeting was the unlawful transport of biological, chemical, nuclear weapons and other dangerous substances on board aircraft.

Earlier, the Secretary General of ICAO, Dr. Taieb Cherif, addressing the China Civil Aviation Development Forum on 9 May 2007, stated that although the global air transport system remains as secure as ever, yet events such as the illegal terrorist plot in the United Kingdom in the Summer of 2006, potentially involving liquids

²⁴For the purposes of transport, infectious substances are defined as substances which are known or are reasonably expected to contain pathogens. Pathogens are defined as microorganisms (including bacteria, viruses, rickettsia, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals. The definition is applied to all specimens except those explicitly excluded in the WHO Guidance Material.

²⁵The international regulations for the transport of infectious substances by any mode of transport are based upon the Recommendations made by the Committee of Experts on the Transport of Dangerous Goods (UNCETDG), a committee of the United Nations Economic and Social Council. The Recommendations are presented in the form of Model Regulations. The United Nations Model Regulations are reflected in international law through international modal agreements.

²⁶Technical Instructions for the Safe Transport of Dangerous Goods by Air: Supplement 2009/10 Edition (Doc 9284).

²⁷The system of packaging is recommended for use all infectious substances. It consists of three layers as follows: Primary receptacle – which is a primary watertight, leak-proof receptacle containing the specimen. The receptacle is packaged with enough absorbent material to absorb all fluid in case of breakage. Secondary packaging – which is a second durable, watertight, leak-proof packaging to enclose and protect the primary receptacle(s). Several cushioned primary receptacles may be placed in one secondary packaging, but sufficient additional absorbent material shall be used to absorb all fluid in case of breakage. Outer packaging – which are secondary packagings placed in outer shipping packagings with suitable cushioning material. Outer packagings protect their contents from outside influences, such as physical damage, while in transit. The smallest overall external dimension shall be 10 cm × 10 cm. Each completed package is normally required to be marked, labelled and accompanied with appropriate shipping documents (as applicable). Special Sub Committee on the Preparation of One or More Instruments Addressing New and Emerging Threats, Introductory Note, *LC/SC-NET-WP/1*, 29/05/07 at p. 6.

used as explosives, reminds us how vulnerable the system is. On another aviation platform, Giovanni Bisignani, Director General and CEO of the International Air Transport Association (IATA) stressed at its Annual General Meeting held in Vancouver from 3 to 5 June 2007 that the industry has changed tremendously in five years since 9/11. Bisignani stated that, six years after the tragic events of 2001, air travel was much more secure but there were unlimited ways to attack the aircraft integrity. He added that there was no perfect security system and terrorists change tactics and weapons. Bisignani rightly pointed out that terrorists are studying what measures the industry is adopting; and that all the air industry can do is make the system strong enough to constitute sufficient deterrent and make aircraft a harder target to hit.

VI. *The AVSEC Panel*

The Aviation Security Panel of ICAO met at its Twentieth Meeting in Montreal from 30 March to 3 April 2009. One of the key areas of discussion at this meeting concerned new and emerging threats to civil aviation. The Panel worked through the Working Group on New and Emerging Threats and noted that significant progress in efforts to proactively identify vulnerabilities and potential gaps in existing measures had been made, that would strengthen *Annex 17* (Aviation Security) to the Convention on International Civil Aviation (Chicago Convention).²⁸ At this meeting, the European Civil Aviation Conference (ECAC) stressed the importance of the challenge posed by cyber threats in light of the current lack of related provisions in Annex 17.

Consequently, the Panel considered the threat of cyber attacks, and some members stressed that this threat is significant. With reference to a proposal to include a Recommended Practice in Annex 17 to ensure that information and communication technology systems used for civil aviation purposes be protected from cyber attacks, the Panel agreed that, given the complexity of this issue, which involves air traffic management systems, aircraft design and operations, the matter requires further analysis by the Working Group on New and Emerging Threats prior to inclusion in Annex 17 or any guidance material. This analysis will be disseminated over the secure website by the end of June 2009 and, depending on the results of the analysis, the Working Group on Amendment 12 to Annex 17 will develop a proposal for amending the Annex, to be presented to the Panel at its 21st meeting.

The Panel also considered the merits of building unpredictability into the aviation security regime. While concern was expressed regarding the impact of

²⁸Convention on International Civil Aviation signed at Chicago on 7 December 1944. See ICAO Doc 7300/9 Ninth Edition, 2006.

unpredictable security measures on passenger confidence in aviation security, many Panel members supported implementation of the concept because of its value as a deterrent. It was suggested that States adopt an approach providing for a baseline regime, but with the addition of unpredictable measures, thus achieving a balance between certainty and unpredictability. With regard to an amendment to Annex 17 in this regard, the need for introducing unpredictability into the aviation security regime was considered, and it was agreed that unpredictability should be promoted in principle but not prescribed. The Panel suggested that if an Annex 17 specification related to unpredictability were to be developed, it would be necessary to ensure that the introduction of this concept by States does not diminish the level of security or result in delays for passengers. Further, the Panel noted that appropriate guidance material may be required to address the potential negative impact of introducing the concept of unpredictability, and proposed the development of guidance material related to unpredictability prior to the introduction of an amendment to Annex 17.

A Conclusion of the Panel was, *inter alia*, that the threat of cyber attacks is real and cannot be ignored, and that further analysis by the Working Group on New and Emerging Threats would be appropriate. Another Conclusion was that the ICAO focal point of contact (PoC) Network is an important tool for sharing critical threat information and should be used more effectively, and that the Secretariat should consider the establishment of a web-based community page. Yet another was that the concept of building unpredictability into the aviation security regime is in principle a useful tool, however, concerns expressed regarding the possible impact on the level of security and the impact on passenger confidence should be resolved before its inclusion as a Recommended Practice in Annex 17.

The Recommendations of the Panel were that:

- (a) The Working Group on New and Emerging Threats propose its new name, terms of reference and composition, including suggestions on how observers might participate in the Working Group, as well as details of its evolving collaboration with the G8 Group, at the 21st Panel meeting.
- (b) The Working Group evaluate the threat of cyber attacks and disseminate the results of its analysis on the secure website by the end of June 2009 and that, depending on the results of this analysis, the Working Group on Amendment 12 to Annex 17 consider developing an amendment to Annex 17 for presentation at the 21st Panel meeting.
- (c) The ICAO Secretariat issue an electronic bulletin reminding States of the importance of subscribing to the PoC Network and providing information on its usage.
- (d) The concept of building unpredictability into the aviation security regime be further considered.²⁹

²⁹See Report of the Aviation Security (AVSEC) Panel, Twentieth Meeting, AVSECP/20 at 2.1.

VII. *Bioterrorism*

The recent recreation of the Spanish flu virus that killed 50 million people worldwide in 1918 proves that deadly viruses are being revisited and are undergoing genetic modification. This brings to bear the inevitable question as to whether there is enough security to stop them from falling into the wrong hands. There is also the ominous prospect – that transportation of these dangerous pathogens by air would leave aviation vulnerable. This article examines precautionary measures currently being taken and the legal and regulatory significance of such measures.

The leakage of dangerous pathogens³⁰ from laboratories presents an ominous analogy to the aviation sector in that the same could well occur in the carriage of such dangerous goods by air. Although past instances of escaping dangerous pathogens are small in number, nonetheless their occurrence and the threat posed to the wellbeing of humanity cannot be underestimated. In 2002 when Anthrax spores escaped from two military laboratories in the United States, the authorities agreed that the leakage was due to a security lapse.³¹ In 2003 a string of such leakages occurred in Asia, this time of the SARS virus.³²

It is now known that the laboratory is not the only place where security lapses could occur. Modern exigencies require samples of deadly pathogens to be transported regularly over vast distances to reach researchers across the world. This calls for a delicate balance between recognizing the compelling need for scientists to exchange and collectively use different strains in order to identify naturally occurring diseases and mutations on the one hand and ensuring that the transport of these infectious substances³³ are carried out according to United Nations Model Regulations³⁴ on the other. These model regulations are the base upon which specific

³⁰Pathogens are micro-organisms (including bacteria, viruses, rickettsia, parasites, fungi) or recombinant micro-organisms (hybrid or mutant) that are known or are reasonably expected to cause infectious disease in humans or animals.

³¹An year earlier, a covert event occurred in October 2001 when anthrax spores were sent through the mail exposing persons in the eastern USA to contaminated mail resulting in deaths, illnesses and identified exposures to Anthrax. Overt, announced events, in which persons are warned that an exposure has occurred, have taken place in the United States, although most of these were determined to have been hoaxes, that is, there were no true exposures to infectious agents.

³²The leakages occurred in China, Taiwan and Singapore. See Air-Tight Security, *Intersec*, June 2007, 33–35 at 34.

³³Infectious substances are defined as substances known to contain, or reasonably expected to contain, pathogens.

³⁴The United Nations has developed recommendations on model regulations for the transport of dangerous goods which recognize that various chemical combinations and mixtures have different requirements in packing for the purpose of transport. See Recommendations on the Transport of Dangerous Goods, Model Regulations, Volume 1, 14th Revised Edition: 2005, Chap. 2.6, p. 113–114. Furthermore, the United Nations Model regulations contain packing instructions for primary, secondary and outer packaging of hazardous goods. See Model Regulations *Id.* Volume 11, Instruction P620 at p. 70. Specimens (human, animal, food, environmental, etc.) known or reasonably expected to contain pathogens are now to be classified as infectious substances. When

provisions for the carriage by air are formulated in the packing of samples of infectious pathogens for transportation by air. The shipment of infectious agents or diagnostic specimens by air must comply with local, national and international regulations. International air transport regulations are contained in various documentation of the International Civil Aviation Organization and *Dangerous Goods Regulations* – an annual publication of the International Air Transport Association published in January, and usually revised on a yearly basis. These ICAO and IATA documents will be discussed in some detail later in this article.

Dangerous Goods Regulations are implicitly accompanied by the requirement that anyone requesting samples should provide the necessary evidence that they are registered with their government for the receipt of such substances and that they have the appropriate facilities, staff and security measures in place to carry out work on the samples received.

There are four diseases recognized as most likely to be associated with bioterrorism potential: anthrax; botulism; plague; and smallpox. Although these agents are considered to be the most likely to be used in bioterrorism they are not usually prioritized in any order of importance. There are other agents which offer potential to bioterrorism such as those causing tularemia, brucellosis, Q fever, viral hemorrhagic fevers, viral encephalitis, and a disease associated with staphylococcal enterotoxin B.

There are others which cause security experts concern as emergent threats to security through bio terrorism. These are Severe Acute Respiratory Syndrome (SARS), monkeypox and pandemic influenza. These are naturally occurring diseases,³⁵ which are of concern because they are new and/or epidemic.³⁶ Outbreaks of dangerous pathogens may occur naturally or as covert or overt events. An outbreak is suspected only upon recognition of unusual disease clusters or symptoms.³⁷ For example, SARS was recognized as a naturally occurring event initially from Southeast Asia in February 2003.

these specimens are transported/shipped for any purpose, including initial or confirmatory testing for the presence of pathogens, they are to be packaged and shipped as infectious substances.

³⁵It is widely recognized that SARS is not a disease but a syndrome. See generally, Abeyratne (2002, pp. 53–80).

³⁶Rapid response to a dangerous pathogen event requires prompt identification of its onset. Because of the rapid progression to illness and potential for dissemination of some of these agents, it may not be practical to await diagnostic laboratory confirmation. Instead, it is necessary to initiate a response based on the recognition of high-risk syndromes, i.e., typical combination of clinical features of the illness at presentation that might alert healthcare practitioners to the possibility of an outbreak. Examples of syndromes potentially resulting from infections with dangerous pathogens include: encephalitis/meningitis, hemorrhagic mediastinitis, severe pneumonia, papulopustular rash, hemorrhagic fever, descending paralysis and nausea/vomiting/diarrhoea.

³⁷An outbreak is usually identified consequent to a rapidly increasing disease incidence (e.g., within hours or days) in a normally healthy population, such as unexplained death with fever in a non-trauma patient, or a botulism-like syndrome, meningitis or encephalitis in more than one patient.

A bioterrorism attack is the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. These agents are typically found in nature, but it is possible that they could be changed to increase their ability to cause disease, make them resistant to current medicines, or to increase their ability to be spread into the environment. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. While some bioterrorism agents, such as the smallpox virus, can be spread from person to person some agents such as anthrax are incapable of doing so.

There have been several noteworthy instances of bioterrorism in the past³⁸ as early as 1915,³⁹ which send an ominous message that it is a distinct possibility in the aviation context. Until recently in the United States of America, most biological defense strategies have been geared to protecting soldiers on the battlefield rather than looking after ordinary people in cities. In 1999, the University of Pittsburgh's Center for Biomedical Informatics deployed the first automated bioterrorism detection system, called RODS (Real-Time Outbreak Disease Surveillance). RODS is designed to draw collect data from many data sources and use them to perform signal detection, that is, to detect a possible bioterrorism event at the earliest possible moment. RODS, and other similar systems, collect data from sources including clinical data, laboratory data, and data from over-the-counter drug sales. In 2000, Michael Wagner, the co director of the RODS laboratory, and Ron Aryel, a subcontractor, conceived of the idea of obtaining live data feeds from "non-traditional" (non-health-care) data sources. The RODS laboratory's first efforts eventually led to the establishment of the National Retail Data Monitor, a system which collects data from 20,000 retail locations nation-wide.

On 5 February 2002, President Bush visited the RODS laboratory and used it as a model for a \$300 million spending proposal to equip all 50 States with bio surveillance systems. In a speech delivered at the nearby Masonic temple, Bush compared the RODS system to a modern "DEW" line (referring to the Cold War ballistic missile early warning system).

³⁸In 1984 followers of the Bhagwan Shree Rajneesh attempted to control a local election by incapacitating the local population by infecting salad bars in 11 restaurants, doorknobs, produce in grocery stores and other public domains with *Salmonella typhimurium* in the city of The Dalles, Oregon. The attack caused about 751 people to get sick (there were no fatalities). This incident was the first known bioterrorist attack in the United States in the twentieth century. In September and October of 2001, several cases of anthrax broke out in the United States which were reportedly caused deliberately. This was a well-publicized act of bioterrorism. It motivated efforts to define biodefense and biosecurity.

³⁹In 1915 and 1916, Dr Anton Dilger, a German-American physician used cultures of anthrax and glanders with the intention of committing biological sabotage on behalf of the German government. Other German agents are known to have undertaken similar sabotage efforts during World War I in Norway, Spain, Romania and Argentina.

The principles and practices of bio surveillance, a new interdisciplinary science, were defined and described in a handbook published in 2006.⁴⁰ Data which potentially could assist in early detection of a bioterrorism event include many categories of information. Health-related data such as those collected from hospital computer systems, clinical laboratories, electronic health record systems, medical examiner record-keeping systems, 911 call center computers, and veterinary medical record systems could be of help in the fight against bioterrorism. Researchers are also considering the utility of data generated by ranching and feedlot operations, food processors, drinking water systems, school attendance recording, and physiologic monitors, among others. Intuitively, one would expect systems which collect more than one type of data to be more useful than systems which collect only one type of information (such as single-purpose laboratory or 911 call-center based systems), and be less prone to false alarms. This indeed appears to be the case.

The inherently uncontrollable nature of a dangerous pathogen makes bioterrorism unattractive as a warfare strategy. However, the potential power of genetic engineering cannot be marginalized or underestimated and the compelling need for continuing vigilance cannot be ignored.

VIII. Cyber-Terrorism

As far back as in March 1998, the web site of the National Aeronautics and Space Administration (NASA) of the United States received a ‘denial of service’ attack, calculated to affect Microsoft Windows NT and Windows 95 operating systems.⁴¹ These attacks prevented servers from answering network connections; crashed computers, causing a blue screen to appear on the computers. The attacked systems were revived, but this attack was a follow up of one in February of the same year, when, for two weeks the US Defence Department had unclassified networks penetrated, where hackers accessed personnel and payroll information.

Cyber-terrorism has the advantage of anonymity, which enables the hacker to obviate checkpoints or any physical evidence being traceable to him or her. It is a low budget form of terrorism where the only costs entailed in interfering with the computer programs of an air transport system would be those pertaining to the right computer equipment.

Any interference with air transport, which would be inextricably linked to the purpose of international civil aviation as enunciated in the *Preamble* to the Chicago

⁴⁰Wagner et al. (2006). Bio surveillance is the science of real-time disease outbreak detection. Its principles apply to both natural and man-made epidemics (bioterrorism). It is worthy of note that in addition to activity in this field in the United States, there is also work being done in Europe, where disease surveillance is beginning to be organized on a continent-wide scale needed to track a biological emergencies. The system not only monitors infected persons, but also attempts to discern the origin of the outbreak.

⁴¹<http://mgrossmanlaw.com/articles/1999>.

Convention which categorically states that the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and people of the world, yet, its abuse can become a threat to the general security.

The maintenance of international peace and security is an important objective of the United Nations,⁴² which recognizes one of its purposes as being *inter alia*:

To maintain international peace and security, and to that end: take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace.⁴³

It is clear that the United Nations has recognized the application of the principles of international law as an integral part of maintaining international peace and security and avoiding situations which may lead to a breach of the peace.

Manuela Guill, a leading expert in threat assessment says:

Cyber-terrorism can be used in many ways. In its simplest form, it can be used as a means of disinformation or psychological warfare by manipulating media attention regarding possible threats, thus causing disruption to airport and aircraft operations. This could result in the reluctance of persons to travel which, in turn, could affect the economies of nations dependent on the movement of air passengers. In its most serious form, cyber-terrorism could lead to fatalities, injuries and major damage at airports and to aircraft in flight.⁴⁴

The particularity of cyber-terrorism is that the threat is enhanced by globalization and the ubiquity of the Internet. It is a global problem in search of a global solution.

IX. MANPADS

Since the events of 11 September 2001, there have been several attempts against the security of aircraft in flight through the misuse of Man Portable Air Defense Systems (MANPADS). The threat of MANPADS to aviation security is by far the most ominous and the international aviation community has made some efforts through ICAO. In recent years, Man Portable Air Defense Systems (MANPADS) have posed a serious threat to aviation security.

MANPADS are extremely effective weapons which are prolific in their availability worldwide. Introduced in the 1950s and originally meant to deter terror attacks from air to ground to be used by State authorities and other protection agencies, these weapons have got into the wrong hands and are being used against

⁴²Charter of the United Nations and Statute of the International Court of Justice, Department of Public Information, United Nations, New York, DPI/511 – 40108 (3-90), 100M at 1.

⁴³Charter of the United Nations and Statute of the International Court of Justice, Department of Public Information, United Nations, New York, DPI/511 – 40108 (3-90), 100M at 3.

⁴⁴Guill (2000, p. 18).

civil and military aviation. The surface to air MANPAD is a light weapon which offers very little warning before impact, and is often destructive and lethal.⁴⁵ They are cheap, easily carried, handled and concealed. It is claimed that there are at least 100,000 and possibly in excess of 500,000 systems in inventories around the world and several thousands of these are vulnerable to theft from State authorities.⁴⁶ It is also claimed that there is a 70% chance that a civil aircraft will be destroyed if hit by a MANPAD.⁴⁷ A study conducted and published in early 2005 by the Rand Corporation concludes that, based on the effects of the attacks of 11 September 2001, it is plausible for air travel in the United States to fall by 15–20% after a successful MANPADS attack on a commercial airliner in the United States.⁴⁸ The international aviation community is aware that civil aircraft are particularly vulnerable to hand held ground to air missiles and that susceptibility avoidance techniques (calculated to avoid being hit) and vulnerability avoidance (survival after being hit) systems must be in place. This is particularly so since tracking the proliferation of MANPADS is difficult since any intelligence gathered on this particular threat is usually *ex post facto*, through the recovery of launchers or fragments from expended missiles. Contrary to popular belief, the MANPAD is considerably durable and can be used several years after inactivity, with recharged batteries.

The World's attention to the deadly threat posed by MANPADS was further drawn in November 2002 when there was an unsuccessful attempt to bring down a civilian aircraft leaving Mombasa, Kenya. Over the past 35 years, significant developments have taken place in dangerous weapons systems creating more opportunities for terrorists. The ready acceptance of new modern technologies by the international community and our growing dependence on them have created many targets, such as nuclear and civil aircraft in flight. Similarly, developments in electronics and microelectronics, and the trend towards miniaturization and simplification have resulted in a greater availability of tactical weapons with longer ranges and more accuracy that are also simpler to operate. One of the most effective developments in individual weaponry is portable, precision-guided munitions (PGMs), which are lightweight and easy to operate. They can usually be carried and operated by a single person. The United States-made Stinger, the British-made Blowpipe and the Russian-made SA-7 missiles are examples of these smaller weapons. These are shoulder-fired, anti-aircraft missiles that have infra-red, heat-seeking sensors in the projectile that guide it to the heat emitted from an aircraft engine. It is known that more than 60 States possess SA-7 missiles and there is no

⁴⁵The lethality of the weapon can be reflected by the 340 MANPADS used by Afghan Mujahedeen rebels to successfully hit 269 soviet aircraft. See: http://www.janes.com/security/international_security/news/.

⁴⁶MANPADS, *Ploughshares Monitor*, Autumn 2004, at 83.

⁴⁷MANPADS, *Ploughshares Monitor*, Autumn 2004, at 83. The deadly accuracy and ease of handling of MANPADS were demonstrated when Somali gunmen shot down two US MH-60 Black Hawk helicopters in October 1993.

⁴⁸Infrastructure Safety and the Environment, *Protecting Commercial Aviation against the Shoulder-Fired Missile Threat*, Rand Corporation, 2005, at 9.

doubt that most of them maintain strict security measures to prevent the outflow of the weapons. However, it has been alleged that some States, including Libya, have supplied PGMs to terrorist organizations. It is incontrovertible that in the hands of terrorists these missiles are not likely to be used against conventional targets such as tanks and military fighter aircraft. Of particular concern is the prospect of civilian airliners being shot at by SAMs and anti-tank rockets as they land at or take off from airports⁴⁹ Dr. Richard Clutterbuck subsumes the great threat of missile attacks:

Recent years have seen increasing use of expensive and sophisticated surface-to-surface and surface-to-air missiles (SSM and SAM) by terrorists, generally of Russian or East European origin and redirected by Arab Governments, notably Colonel Gadafi's. Continuing development of these weapons for use by regular armies will ensure that new and more efficient versions will become available for terrorists.⁵⁰

With increased airport security, the possibility of placing explosive devices on civil aircraft is becoming more difficult, but now the same destructive result can be achieved far more easily by using modern missiles or rockets.

There are a few incontrovertible truths that drive the issue of the illegal carriage of infectious pathogens by air. The first is that, as recognized by WHO, the lead role in legislative and regulatory control of the issue lies well within ICAO. The second is that, one has to go back to the basics of the rule book and start with the Preamble to the Chicago Convention. The Preamble unequivocally links the future development of aviation to "general security" which essentially means that aviation should not only be concerned with persons and property directly involved with air transport but also with the rest of the world that might be adversely affected by the release of infectious pathogens through aviation.

The third home truth is that it is a pre-eminent responsibility of States to ensure security at laboratories in their territories as the illegal carriage of infectious substances by air is linked to the initial leakage from a laboratory. Therefore it is extremely important for States to strictly enforce their dangerous goods legislation. It is also important to treat this subject holistically in terms of the world at large and not restrictively by singling out only those involved in the flight concerned. Finally, States have to adopt a security culture that admits of an overall approach to the threat as a potential harm to the health of humanity. This should inevitably include strict adherence by States to the provisions of Annexes 17 and 18 and inclusion of new Standards in the Annexes as necessary, together with an abiding understanding that the illegal carriage of infectious pathogens by air portends a threat both to safety and security of aviation.

As for cyber-terrorism, the offences related to cyber-terrorism should be addressed on the basis that individuals have international duties which transcend the national obligations of obedience imposed by an individual State. By the same token, it must also mean that individual States owe their citizens and the world at

⁴⁹Hanle (1989, p. 185), Ofri (1984, p. 49), Pierre (1975, p. 1256), Dorey (1983, p. 142).

⁵⁰Clutterbuck (1991, p. 175).

large a responsibility for maintaining world security. The philosophy of these two premises has to be vigorously employed in bringing to fruition the above measures. It is only then that a substantial legal contribution could be made to the controlling of this offence.

Finally, with regard to MANPADS, the gathering of reliable intelligence remains the first line of defense. Although modern technologies clearly aid terrorists in terms of weapons and targets, technology can also be used against terrorists. Governments which are endowed with the necessary technology can keep track of terrorist organizations and their movements with the aid of computers. At the same time, electronic collection methods and signals intelligence afford the possibility of eavesdropping on and intercepting terrorist communications, leading to better predictions of their operations. One of the instances where intelligence gathering has worked well to prevent terrorism occurred in September 1984, when the Provisional IRA spent an estimated £1.5 million in the United States on a massive shipment of seven tons of arms. With the help of an informer about a forthcoming shipment of weapons, including rockets, to the Provisional IRA from the United States, the FBI informed British intelligence, who in turn contacted the Irish, and the ship carrying the arms was tracked by a US satellite orbiting 300 km above the earth. The satellite photographed the transfer of the arms to a trawler. Finally, two Irish Navy vessels intercepted the trawler and British security forces arrested the crew.⁵¹ This incident shows that intelligence gathering with the help of high technology can cut off the transfer of missiles and other weapons to terrorists.

The installation of a sophisticated antimissile system similar to that employed on military aircraft to divert surface-to-air missiles is an effective deterrent. One good example is the measure taken by the British government which, immediately after the discovery of 20 SA-7s in the coaster *Eksund*, which was intercepted by French authorities off the coast of Brittany in November 1987 when bound for the IRA, fitted all British Army helicopters flying in Northern Ireland with electronic and other decoy systems to confuse the missile's heat-seeking guidance system. These included the US-made Saunders, AN/ALG 144. This system, when linked to the Tracor AN/ALE 40 chaff dispenser, works by jamming the missile's homing radar and sending infra-red flares and chaff to act as a decoy for the heat-seeking device.⁵² The system is used by both the US and the Israeli Armies, which have been well-pleased with its performance. Until the British realised that the IRA might be in possession of SAMs, the Ministry of Defense hesitated to install such a system because of the high cost involved, and its decision to do so shows the seriousness of the threat. Another example of a good counter-measure is the response of El Al airlines to the threat of such an attack which included the installation of electronic countermeasure equipment similar to that employed on military aircraft to divert surface-to-air missiles.⁵³ However the problem is that

⁵¹The *Daily Telegraph*, 16 October 1984; *The Times*, 12 December 1984.

⁵²The *Daily Telegraph*, 7 January 1988.

⁵³Lewis and Kaplan (1990, p. 226); Crenshaw (1987, p. 126).

these countermeasures are not yet fully effective, although they could minimize the threat. Hence there is a need to proceed diligently with the development of systems that are guaranteed to be able to prevent this type of attack against civil aviation.

For a successful missile attack against aircraft, the firing position has to be located within range of the flight path. A missile's guidance system is such that the weapon has to be fired within a few degrees of the flight path if the infra-red guidance is to locate the target. Accordingly, a possible preventive measure would be to prevent terrorists from getting into a firing position with their missiles. However, it would be very difficult to cut off areas of up to 6 km wide that lie in the paths of aircraft as they land and take off. This measure is therefore impracticable if not impossible.⁵⁴ This difficulty can be overcome to an extent by patrolling the outer areas of airports in times of stringent security conditions might prevent such attacks. Even in times when no specific threat has been received, it is within the capacity of most States to monitor those strips of land from which a SAM could be launched and thus minimize the risk. At the same time, these security operations would deter terrorists from spending vital resources on buying SAMs given the limited possibilities for their use.

Finally, it must be noted that, whatever counter measures are used in responding to new and emerging threats in aviation, the thread which binds the fabric of anti-terrorism is risk management. As one commentator said, the achievement of safety in aviation is no longer an esoteric activity.⁵⁵ It has to be a structured series of measures which starts by identifying hazards, and evaluating potential scenarios. It should end in the implementation of a management process. What is therefore needed is systematic assessment and a global means of ranking risks based on their seriousness and significance.

X. The Diverse Nature of Missile Attacks

The use of SAMs and anti-tank rockets by terrorists goes back to 1973. On 5 September 1973 Italian police arrested five Middle-Eastern terrorists armed with SA-7s. The terrorists had rented an apartment under the flight path to Rome Fumicino Airport and were planning to shoot down an El Al airliner coming in to land at the airport.⁵⁶ This arrest proved a considerable embarrassment to Egypt because the SA-7s were later traced back to a batch supplied to it by the Russian Union. It was alleged that the Egyptian government was supplying some of the missiles to the Libyan army but inexplicably, the SA-7s had been directly rerouted to the terrorists. This incident also placed the Russian Union in an awkward position

⁵⁴Dorey (1983, p. 142).

⁵⁵Stewart (1993, p. 12).

⁵⁶Dobson and Payne (1987, p. 366).

because of the possibility that its new missile and its policy of the proxy use of surrogate warfare against democratic states were revealed to the West.⁵⁷

The plot of the missile attack on El Al derived from an appalling incident on 21 February 1973, when a Libyan B-727 was shot down over the Sinai desert by an Israeli fighter, killing the 108 innocent people on-board.⁵⁸ The Libyan people called for vengeance against Israel. Libya urged the other Arab States to send their warplanes against Israel's major cities and to destroy Israeli airliners wherever they could be found.⁵⁹

On 5 January 1974, 220 soldiers and 200 police sealed off five square miles around Heathrow International airport in London after receiving reports that terrorists had smuggled SA-7s into Britain in the diplomatic pouches of Middle-Eastern embassies and were planning to shoot down an El Al airliner.⁶⁰

Another significant incident occurred on 13 January 1975 when an attempt by terrorists to shoot down an El Al plane with a missile was believed to have brought civil aviation to the brink of disaster. Two terrorists drove their car onto the apron at Orly airport, where they set up a rocket launcher and fired at an El Al airliner which was about to take off for New York with 136 passengers. The first round missed the target thanks to the pilot's evasive action and hit the fuselage of a Yugoslav DC-9 aeroplane waiting nearby to embark passengers for Zagreb. The rocket failed to explode and no serious casualties were reported. After firing again and hitting an administration building, which caused some damage, the terrorists escaped by car. A phone call from an individual claiming responsibility for the attack was received at Reuters. The caller clearly implied that there would be another such operation, saying 'Next time we will hit the target'.

In fact, six days later another dramatic though unsuccessful attempt did occur at Orly airport. The French authorities traced the attack to the PFLP Venezuelan terrorist, and leader of the PFLP group in Europe, Carlos.⁶¹ It is also known that once again an El Al airliner had been deliberately chosen as a target by Gadafi in an attempt to avenge the loss of the Libyan airliner shot down by Israel over the Sinai Desert.⁶²

Despite these failures, on 25 January 1976 another abortive attempt was carried out by three PFLP terrorists, who were arrested by Kenyan police at Nairobi Airport – following a tip-off by Israeli intelligence to the Kenyan General Service Unit – before they had time to fire SA-7 missiles at an El Al aircraft carrying 100 passengers. In connection with this operation, two members of the German Baader-Meinhoff Faction, Thomas Reuter and Brigitte Schultz, were also arrested. After 10 days of interrogation, the terrorists were handed over to Israel by the Kenyan

⁵⁷Dobson and Payne (1977, p. 134).

⁵⁸Keesing's Contemporary Archives, 5–11 March 1973, p. 25757.

⁵⁹Keesing's Contemporary Archives, 5–11 March 1973, p. 25757.

⁶⁰Mickolus (1980, p. 428).

⁶¹Dobson and Payne (1977, p. 53).

⁶²Dobson and Payne (1977, p. 53).

government. However, it was not until March 1977, 14 months after the arrests in Kenya, that the Israelis officially announced that they were holding the three Palestinian and two German terrorists. During this period an unsuccessful attempt to gain their release was undertaken by the PFLP in June 1976, when Palestinian terrorists hijacked an Air France aircraft to Entebbe. The names of the five being held in Israel were included on the list of prisoners whose release was demanded in exchange for the hostages. The three Palestinians were released by the Israeli government in 1985.⁶³

There has been a marked increase in missile attacks since 1984. On 21 September 1984 Afghan counter-revolutionaries fired a surface-to-air missile and hit a DC-10 Ariana Airliner carrying 308 passengers. The explosion tore through the aircraft's left engine, damaging its hydraulic system and a wing containing a fuel tank. The captain of the aircraft, however, managed to land the aircraft safely at Kabul International Airport.⁶⁴ Another significant incident took place on 4 April 1985, when a member of Abu Nidal group fired an RPG rocket at an Alia airliner as it took off from Athens Airport. Although the rocket did not explode, it left a hole in the fuselage.⁶⁵

Advanced missiles and rockets can be found in many terrorist and insurgent armouries. It is suspected that some terrorist organizations, including Iranian militia in Lebanon, the Provisional Irish Republican Army and various African and Latin American insurgents, possess the sophisticated Russian-made RPG-7 portable rocket launcher, but it is disturbing to note that some terrorist organizations, most notably Palestinian groups, have their own RPG-7-manufacturing facilities. In addition, more than a dozen other terrorist and insurgent groups are known to possess portable surface-to-air missiles. These groups include various Cuban surrogates, Colombian drug dealers, and a number of African, European and Palestinian terrorist organizations.⁶⁶

The possibility of undeterred use of missiles may be encouraged by the rapid proliferation of such weaponry and the publicity to be gained by using such systems. The enhanced effectiveness of missiles against aircraft makes the threat of such attacks real.

⁶³Mickolus (1980, p. 581); Al-Hadaf, Al-Hadaf ma al-Babtal al-Muharrarin: Al-Muo taqilun hawwalu Dhallam al-Asr ila Nidhal Mushriq (Al-Hadaf with the Liberated Heroes: The detainees Transformed the Gloom of Imprisonment Into a Shining Struggle), June 1985, pp. 35–41; *Associated Press*, 15 August 1979.

⁶⁴U.S. Department of Transportation (FAA), *Worldwide Significant Acts Involving Civil Aviation*, 1984, p. 14.

⁶⁵U.S. Department of Defence, *Terrorist Group Profiles* (Washington DC: U.S. GPO, 1989), p. 7.

⁶⁶Adams (1990, pp. 60–61); Wilkinson (1986, pp. 39–40); Dobson and Payne (1982, p. 119).

XI. Installation of an Anti-missile System

The installation of a sophisticated antimissile system similar to that employed on military aircraft to divert surface-to-air missiles is an effective deterrent. One good example is the measure taken by the British government which, immediately after the discovery of 20 SA-7s in the coaster *Eksund*, which was intercepted by French authorities off the coast of Brittany in November 1987 when bound for the IRA, fitted all British Army helicopters flying in Northern Ireland with electronic and other decoy systems to confuse the missile's heat-seeking guidance system. These included the US-made Saunders, AN/ALG 144. This system, when linked to the Tracor AN/ALE 40 chaff dispenser, works by jamming the missile's homing radar and sending infra-red flares and chaff to act as a decoy for the heat-seeking device.⁶⁷ The system is used by both the US and the Israeli Armies, which have been well-pleased with its performance. Until the British realised that the IRA might be in possession of SAMs, the Ministry of Defense hesitated to install such a system because of the high cost involved, and its decision to do so shows the seriousness of the threat. Another example of a good counter-measure is the response of El Al airlines to the threat of such an attack which included the installation of electronic countermeasure equipment similar to that employed on military aircraft to divert surface-to-air missiles.⁶⁸ However the problem is that these countermeasures are not yet fully effective, although they could minimize the threat. Hence there is a need to proceed diligently with the development of systems that are guaranteed to be able to prevent this type of attack against civil aviation.

XII. The Perimeter Guard

For a successful missile attack against aircraft, the firing position has to be located within range of the flight path. A missile's guidance system is such that the weapon has to be fired within a few degrees of the flight path if the infra-red guidance is to locate the target. Accordingly, a possible preventive measure would be to prevent terrorists from getting into a firing position with their missiles. However, it would be very difficult to cut off areas of up to 6 km wide that lie in the paths of aircraft as they land and take off. This measure is therefore impracticable if not impossible.⁶⁹ This difficulty can be overcome to an extent by patrolling the outer areas of airports in times of stringent security conditions might prevent such attacks. Even in times when no specific threat has been received, it is within the capacity of most States to monitor those strips of land from which a SAM could be launched and thus minimize the risk. At the same time, these security operations would deter terrorists

⁶⁷The *Daily Telegraph*, 7 January 1988.

⁶⁸Lewis and Kaplan (1990, p. 226); Crenshaw (1987, p. 126).

⁶⁹Dorey (1983, p. 142).

from spending vital resources on buying SAMs given the limited possibilities for their use.

Although the success rate so far of Western States in preventing terrorist missile attacks against civil aviation is satisfactory, and security forces, with the help of good intelligence, have been successful in tracking down and capturing missiles before they could be used, it is not unlikely that there will be attempts to use surface-to-air missiles to attack civil aviation in the near future. As some targets are becoming more difficult for terrorists to attack it can be anticipated that they will make efforts to overcome the enhanced security systems as well as redirecting their efforts towards less secure targets. The displacement of the increasingly ineffective system of hijacking by missile attacks against civil aviation is a real threat.

XIII. International Accord

In April 1996 in Vienna, States representatives of the “New Forum” held a Plenary to confirm the “Wassenaar Arrangement”,⁷⁰ earlier agreed upon in the city of Wassenaar, the Netherlands, that addresses risks to regional and international security related to the spread of conventional weapons and dual-use goods and technologies while preventing destabilizing accumulations of weapons such as MANPADS. The *Wassenaar Arrangement* complements and reinforces, without duplication, the existing control regimes for weapons of mass destruction and their delivery systems, as well as other internationally recognized measures designed to promote transparency and greater responsibility, by focusing on the threats to international and regional peace and security which may arise from transfers of armaments and sensitive dual-use goods and technologies where the risks are judged greatest. It is also calculated to enhance co-operation in order to prevent the acquisition of armaments and sensitive dual-use items for military end-uses, if the situation in a region or the conduct of a state is, or becomes, a cause for serious concern to the Participating States. It is not the intent and purpose of the Arrangement to be directed against any state or group of states, nor will it impede bona fide civil transactions. Furthermore it will not interfere with the rights of states to acquire legitimate means with which to defend themselves pursuant to Article 51

⁷⁰Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, Elements for Export Controls of MANPADS and the Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and other Related Material. The participating States were Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom and United States.

of the Charter of the United Nations.⁷¹ The Arrangement allows for Participating States to control all items set forth in a list of dual-use goods and technologies and in the munitions list, with the objective of preventing unauthorized transfers or re-transfers of those items. Participating States also agree to exchange general information on risks associated with transfers of conventional arms and dual-use goods and technologies in order to consider, where necessary, the scope for co-ordinating national control policies to combat the risks involved. At the tenth Plenary meeting of the *Wassenaar Arrangement*, held in Vienna on 8–9 December 2004, participating States reaffirmed their intent and resolve to prevent the acquisition by unauthorized persons of conventional arms and dual-use goods and technologies, in particular by terrorist groups and Organizations. States also exchanged information on various national measures adopted to implement the provisions of the Arrangement.

The Wassenaar Arrangement is the first global multilateral arrangement on export controls concerning conventional weapons and sensitive dual-use goods and technologies. It has not been designated the conventional term “convention” or “agreement” but nonetheless carries the agreement of participating States to collaborate in complementing, without duplication existing regimes on the non-proliferation of weapons of mass destruction and their delivery systems. The *Wassenaar Arrangement* is not a treaty in the sense of Article 102 of the United Nations Charter,⁷² nor is it a treaty as defined by the *Vienna Convention on the Law of Treaties* of 1969, Article 2 of which defines a treaty *inter alia* as an international agreement concluded between States in written form and governed by international law. However, it remains an agreement between sovereign States concerning the implementation of municipal law of each participating State. This does not, however, mean that the *Wassenaar Arrangement* cannot be considered an international agreement or that it is invalid. It merely means that the Arrangement does not come within the purview of the Vienna Convention. It is worthy of note that Article 3 of the Convention explicitly recognizes that international agreements between States do not lose their validity merely because they do not come within the ambit of the Convention.⁷³

As mentioned earlier, the Assembly of ICAO,⁷⁴ at its 36th Session (Montreal, 18–28 September 2007), adopted Resolution A36-2, wherein the Assembly

⁷¹Article 51 of the United Nations Charter provides, *inter alia*, that nothing in the Charter will impair the inherent right of individual or collective self-defense if an armed attack occurs against a member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security.

⁷²Infrastructure Safety and the Environment Article 102 of the UN Charter stipulates that every treaty and every international agreement entered into by any member of the United Nations after the Charter comes into force shall be registered with the UN Secretariat as soon as possible.

⁷³Shaw (2003, p. 812).

⁷⁴The ICAO triennial Assembly, where its 190 member States gather to evaluate policy and make new policy as necessary through its Resolutions, is the supreme governing body of the Organization.

expressed its deep concern regarding the global threat posed to civil aviation by terrorist acts, in particular the threat posed by MANPADS, other surface-to-air missiles systems, light weapons and rocket propelled grenades.

The Assembly noted that the United Nations General Assembly, on 8 September 2006, adopted Counter-Terrorism Strategy, which is a unique global instrument that will enhance national, regional and international efforts to counter terrorism. The Strategy emphasizes the need to combat illicit arms trade, in particular small arms and light weapons, including MANPADS. Member States have agreed to a common strategic approach to fight terrorism, not only by sending a clear message that terrorism is unacceptable but also resolving to take practical steps individually and collectively to prevent and combat it. These steps include a wide range of measures ranging from strengthening State capacity to counter terrorist threats, to better coordinating United Nations System's counter-terrorism activities.

The Assembly recalled *United Nations General Assembly resolutions 61/66 on the illicit trade in small arms and light weapons in all its aspects, 60/77 on prevention of the illicit transfer and unauthorized access to and use of man-portable air defence systems, 61/71 on assistance to States for curbing the illicit traffic in small arms and light weapons and collecting them and 60/288 on the United Nations Global Counter Terrorism Strategy. It also noted that the International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (A/60/88) and the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, Elements for Export Controls of MANPADS, and the Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and other Related Material.*

Noting with satisfaction the ongoing efforts of other international and regional organizations aimed at developing a more comprehensive and coherent response to the threat to civil aviation posed by MANPADS; and recognized that the specific threat posed by MANPADS requires a comprehensive approach and responsible policies on the part of States.

The Assembly urged all Contracting States to take the necessary measures to exercise strict and effective controls on the import, export, transfer or retransfer and stockpile management of MANPADS and associated training and technologies, as well as limiting the transfer of MANPADS production capabilities. It called upon all Contracting States to cooperate at the international, regional and sub-regional levels with a view to enhancing and coordinating international efforts aimed at implementing countermeasures carefully chosen with regard to their effectiveness and cost, and combating the threat posed by MANPADS. Furthermore, the Assembly called upon all Contracting States to take the necessary measures to ensure the destruction of non-authorized MANPADS in their territory, as soon as possible, while urging all Contracting States to implement the International instruments to enable States to identify and trace, in a timely and reliable manner, illicit small arms and light weapons as referred to in the United Nations General Assembly Resolution 61/66 on the illicit trade in small arms and light weapons in all its aspects. All Contracting States were urged to apply the principles defined in the Elements for

Export Controls of MANPADS of the Wassenaar Arrangement. Finally, the Assembly directed the ICAO Council to request the Secretary General to monitor on an on-going basis the threat to civil aviation posed by MANPADS and to continuously develop appropriate countermeasures to this threat and periodically request Contracting States to inform the Organization regarding the status of implementation of the resolution and the measures taken to fulfil its requirements.

XIV. Other Current Threats

Security restrictions on the carriage of liquids, aerosols and gels (LAGs) in hand baggage were introduced on 10 August 2006, in response to the foiling of an alleged terrorist plot in the United Kingdom against aviation using improvised explosive devices containing homemade liquid explosives. An initial ban on the carriage of all hand baggage on flights leaving the United Kingdom was subsequently modified to a restriction on the amounts of liquids, aerosols and gels (LAGs) which were permitted to be carried by passengers through screening points. These restrictions were adopted elsewhere in Europe and in North America. They were subsequently harmonised within the European Union by an amendment to the European Commission regulations which came into effect on 6 November 2006.

As a global follow up to these measures, ICAO recommended their universal adoption (not later than 1 March 2007) in a State Letter. ICAO also reacted to the new threat with urgency and efficiency in calling a special meeting of the Council on 17 August 2006 to explore ways of countering the new threat. As international civil aviation industry attaches great importance to the security screening of liquids, many countries have made a lot of efforts on the study of liquids detect methods. At present and in the near future, the most effective and safest security way is combination of regular measures, such as X-ray screening, visual examination, inspection by removing the bottle lids, restriction on carrying liquids, etc. ICAO temporary security control guidelines provide a uniform operation mode of liquids screening, which is helpful to the unification of international civil aviation security standard.

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