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AVIATION

GNSS LIABILITY: CURRENT LEGAL FRAMEWORK AND PERSPECTIVES FOR THE FUTURE FROM THE INTERNATIONAL AVIATION POINT OF VIEW

Federico Bergamasco *

Introduction

The Global Navigation Satellite Systems (GNSS) is widely considered one of the most crucial technological achievements of the 21st century. Since the beginning of the 1990s, it has been regarded by ICAO as a potential key element in the development of the Communications, Navigation, Surveillance / Air Traffic Management systems (CNS/ ATM), rendering obsolete much of today's ground-based navigation services.
The current worldwide providers, "Global Positioning System" (GPS) from the United States and "Globalnaya Navigatsionnaya Sputnikovaya Sistema" (GLONASS) from the Russian Federation, are both dual-use, military-controlled, state-operated systems, made available for private use worldwide and free of charge.
In a few years, other similar systems will be deployed. Among them, the EU-ESA Galileo System will be a civilian system, operated by a consortium of public entities and private companies for the provision of a differentiated range of commercial services.
Despite the undeniable benefits, the satellite navigation involves great risk to cause damage to human life and properties, with particular regard to its application in air navigation. The absence of an international convention explicitly regulating the GNSS liability forces the potential victims, both GNSS users and innocent third parties, to an enduring limbo of legal uncertainty.

Current GNSS legal framework relevant to international air traffic

At the beginning of the 1990s, ICAO was believed to have a fundamental role in the future construction of a comprehensive regulation on this subject. Indeed, it was chosen by the two powers as the most appropriate channel to offer the availability of their signal to the worldwide aviation community.
ICAO accepted the offer through "Exchange of Letters" with the US on 14 and 27 October 1994, and with the Russian Federation on 4 June and 29 July 1996[1]. The content of the exchange of letters regarded the assurance of universal accessibility, the non-discriminatory access, the integrity and reliability of the service and the respect of national sovereignty. The topic of liability for potential signal failure was substantially ignored, perhaps on purpose, due to its political sensitivity.
Considering their novelty, it is then necessary to figure out how the provision of GNSS services deals with the existing public air law regime, and in particular its compatibility with the principles drafted in the Chicago Convention. The principal provision, Article 28, "Air navigation facilities and standard systems", states indirectly the duty of the States to provide CNS/ATM services in their territory. It is a reflection of the general principle of State sovereignty contained in Article 1. In the case of GNSS, air navigation facilities would be partially controlled and operated by a foreign country. This

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could potentially jeopardize the sovereignty rights of the territorial State, and the consequent international responsibility originating from Article 28. Despite the potential problems that this inconsistency could present, the provision seems to be flexible enough not to become a legal obstacle for the implementation and operation of such extra-territorial services. The implementation of additional bilateral agreements between Russia and United States, and States that want to exploit GPS/GLONASS, may negotiate additional terms and conditions to regulate the matter and safeguard their sovereignty[2]. In addition, the ICAO Policy document adopted on 9 March 1994 states that implementation and operation of CNS/ATM systems, in which GNSS will be a key element, shall "neither infringe nor impose restrictions upon the sovereignty of States, or their authority or responsibility in the control of air navigation and the promulgation and enforcement of safety regulations". In general, it is possible to say that according to ICAO's conclusions there is full compatibility between GNSS and the Chicago Convention principles, with no need for further amendments[3].
From a more technical point of view, reference has to be made to Annex XI of the Chicago Convention, containing SARPs related to Air Traffic Services. These are the relevant SARPs for GNSS.
During the 1990s, ICAO produced a vast amount of non-binding documents dealing with the issue, among those the most significant ones are the "Statements of ICAO Policy on CSM/ATM Systems: Implementation and Operation", adopted by the Council in 1994, and the "Charter on the Rights and Obligations of States Relating to GNSS Services", adopted in the form of the ICAO Assembly Resolution in 1998. The latter, for the most part, simply elaborates certain principles of the 1994 Statements. The provisions are elaborated in a very broad form, and their content regards basically the compatibility with international law, including the Chicago Convention, the safety of international civil aviation as paramount principle, the non-discrimination principle, the safeguard of State sovereignty and authority, the assurance of continuity, availability, integrity, accuracy and reliability of the signal, the charges and the principles of co-operation and mutual assistance. In criticising their broad formulation and their non-binding efficacy, it is necessary to take into account that they were adopted in the optimistic expectation of a continuous development towards an imminent international convention on GNSS services. The avoidance of more sensitive topics, like the liability of signal providers, is indeed hidden evidence of the legal and political problems that would have paralysed such process in the following years.
On the whole, the prevailing international public air law regime, both in its binding and non-binding tools, provides either a vague, incomplete or indirect legal framework for the provision of GNSS services. So far, liability has not been regulated, leaving the potential victims without tailored remedies.

Liability: general considerations

The main risk implied in GNSS services is an air accident caused by a signal failure. That event gives rise to a high complexity from a legal point of view, due to a number of factors.
First, it meets with a substantial legal vacuum. As stated above, there are neither international air law provisions, nor rules in domestic legal systems directly addressing these particular conditions. In addition, the non-commercial nature of the service, in this case, means that there is no contract between the service provider and the user, and therefore no contractual provisions dealing with liability.
In case of accidents, the main potential victims would be the passengers of the aircraft, the third parties and the airline itself. On the other side, the responsible entity – at least from the causal-link point of view - would be the signal provider, i.e. the US

or Russian State. Furthermore, the lack of a direct discipline is accompanied by the existence of a certain number of legal instruments that deal with air accidents in general, and that would be applicable also in such particular circumstances. This influence might lead, in some cases, to unfair consequences, as the final burden of compensation would not fall upon the concretely responsible entity.
The current international instruments that can be applied are the Warsaw Convention (WC29), the Montreal Convention (MC99), and the Rome Convention (RC52).
Without entering into a detailed analysis of the wide range of legal situations that this kind of "interference" could bring about, it is possible to assume that, due to the presumed fault stated by these instruments, the final burden of compensation would most likely lie upon the airline. In the Warsaw Convention, the airline is presumed liable, but could avoid paying damages if able to prove that "he and his agents have taken all necessary measures to avoid the damage or that it was impossible for him or them to take such measures"[4]. In this case, due to the exclusivity principle, the unfair consequence is that passengers would remain without any hope of obtaining compensation. A similar conclusion is valid if the Montreal Convention is applied, for compensation amounts exceeding 113.000 SDR. Up to this limit, on the other hand, the airline would be absolutely liable, disregarding its concrete role in the cause of the damage.
Finally, third parties can claim compensation under the Rome Convention, stating again an absolute and limited liability upon the operator.
Considering the principle of exclusivity stated by each of these conventions[5], we would have the airlines bearing the burden of compensation to passengers and third parties, as all potential claims would be in principle channelled towards them. This would make the airline the most probable entity interested in a claim against the GNSS provider[6].
There is no provision in the Montreal, Warsaw, Rome Conventions or elsewhere preventing the right of recourse by the carrier against third responsible parties. But, again, the question arises whether the carrier could find a legal basis upon which to ground its rights.

Responsibility and liability under the *corpus juris spatialis*

A possible solution, according to some scholars[7], can be found in the *corpus juris spatialis*.
Although not dealing directly with this kind of services, it is necessary to keep in mind that GNSSs are a satellite-based application, and therefore strongly linked to the discipline of international space law.
The first provision potentially dealing with the present problem is Article VI of the Outer Space Treaty (OST). According to it, States bear international responsibility for national space activities whether carried on by the State itself or by its private entities. It is not appropriate here to make a long digression about the exact wording of the Article and the implied legal problem. It is possible however, to present some considerations. Firstly, regarding its scope, the provision covers general "space activities". GNSS is a space-based technology, performed through satellites; therefore, it falls within the definition of "space activity"[8].
As regards content on the other hand, the Article deals with international *responsibility*. The fundamental element of responsibility is the violation by a State of an international obligation, provided by a primary rule, and giving birth to a secondary system of rules that regulates the consequences of unlawful behaviour.
It is a concept strictly related to international law, and proper to State-to-State relations. The effectiveness of this legal tool for a private person to seek compensation is

at least uncertain. First, the adequacy of the "Exchange of Letters" to create an international obligation to provide the signal, upon the US and Russia, towards ICAO and its member States, can be questioned. Can it be compared to a proper international obligation to provide the signal, upon the US and Russia, towards ICAO and its member States, can be questioned. Can it be compared to a proper international agreement, with an equivalent binding efficacy[9]? And, assuming that, is a single signal malfunction a breach of an international obligation?
Assuming that an "Exchange of Letters" is relevant and binding from the international point of view, and that a signal failure is a breach, can Article VI OST be used by a private individual to base a civil claim against a sovereign entity? The structure of international responsibility itself, as evident, prevents a private person from doing that. First, only a State, having autonomous international legal personality, is entitled to bring a claim for a breach of an international obligation by another legally relevant entity. In such case, the State should pursue the claim in the interest of its citizens. The restoration of the damage would depend, therefore, on the political will of the State to enter into an international dispute.
On the whole, the great number of uncertainties and the impossibility for the private entity to sue the responsible State directly makes Article VI an inefficient instrument to seek compensation.
Article VII OST, which can be considered the framework-provision for the subsequent Liability Convention of 1972 (LC72), on the contrary deals with so-called *State liability*. At a first glance, here the State seems to be directly responsible for damages inflicted on a private entity, irrespective of the unlawfulness of its conduct, on an absolute liability basis according to Article II.
There are a few problems that weaken this instrument as well. The applicability of the LC72 on the whole depends at first on the kind of damage caused. The majority of the doctrine agrees on the idea that the wording "damage caused by a space object", read together with other provisions of the same Treaty, means damage caused by a physical collision. Therefore, damages caused by radio signals would not be covered. In addition to this, the general *ratio* of the Convention is to regulate relations between States and third parties that arise from a random accident. In the case of GNSS, on one hand there is no contract between the parties, while on the other hand the victim is benefiting from such space application, exploiting the signal free of charge, and has implicitly accepted the risks implied. As a consequence, the victim can hardly be considered a pure "third party", because of the *de facto* relationship with the provider, nor a pure "innocent party", due to the fact that it is taking advantage of the space application. Therefore, it is difficult to compare its position to the "innocent third parties" that LIAB aims to defend.
Last but not least, the regime provided by LIAB is highly problematic and full of inconsistencies and contradictions, and it has never been applied. Even by stretching the meaning of "damage caused by space object" and ignoring the colliding general *ratio*, it is inadequate to extend such a problematical and, until now, purely theoretical legal regime to a new and promising space application.

Current potential tools

As highlighted above, neither international air law nor international space law provide a satisfying solution to GNSS liability issues. The only legal instruments available to an airline suffering damage because of a signal malfunctioning are national tort laws, applicable according to the rules of private international law. This may cause disparity treatment between victims, depending on the rules set by different national laws on the various aspects of damage restoration, and a subsequent situation of legal un-

certainty. Due to the lack of a contractual link between the user and the provider, national contract laws here cannot be considered useful.
Furthermore, GNSS services are currently provided by States, which are sovereign entities, in a non-commercial form, as a non-remunerated act of generosity towards the global community. The provision of the signal then seems to fall under the category of *acta iure imperii*[10].
This particular category encompasses acts, which can be performed only by States and their servants, and is protected by sovereign immunity from civil claims[11].
States providing GNSS service are entitled to invoke sovereign immunity to protect themselves and their servants from claims arising from an air accident caused by a signal failure, leaving again, in this way, the airline without any useful means to seek compensation.
The situation might be slightly different with regard to GPS and the United States as a signal provider, as US domestic law is applicable pursuant to the US conflict of laws rules.
Under the Federal Tort Claims Act (FTCA), the United States Government has waived immunity for claims for money damages where the loss is caused by the negligent or wrongful act or omission of a government employee acting within the scope of its office[12]. According to the general principle provided by this statute, then, a private person seems to be able to sue the US Government in a Federal Court for damage arising from a GPS signal failure caused by negligence or wrongfulness.
The FTCA, on the other hand, contains two main exceptions to this waiver that may prevent a private person from successfully concluding his claim: the "foreign country exception" and the "discretionary function exception".
The first one concerns the jurisdictional applicability of the statute, and states that the FTCA is not applicable to any claim arising in a foreign country[13]. Since the GPS has global coverage, it is likely that a signal failure could also affect a non-US citizen, using GPS services outside the United States. As a consequence, the damage would arise outside US territory, but according to the wording of the article it appears that in this case that the FTCA would not apply and therefore the United States would be immune from suits.
In any case, the broad formulation of the text may create some uncertainty. What is the precise meaning of the expression "the claim arises in a foreign country"? As a direct case law on GPS accidents does not exist yet, we have to look at the general jurisprudence concerning FTCA. US courts have focused on the place where the negligent act occurred, rather than on the location where the harmful effects took place. A failure caused by negligent data upload at the MCS in Colorado[14] then, would not fall within this exception and therefore the FTCA could be applied, thereby allowing a private individual to successfully file his claim, even though the event took place somewhere beyond US borders. Thus, unless the court held the negligent act leading to damage as arising in outer space instead of in Colorado[15]. In such a case, the 1993 *Smith v. United States* case would complicate the situation, as the Supreme Court, held that Antarctica[16] is a foreign country within the scope of FTCA, even though it has no recognized government. According to this interpretation, the substantial parallelism of the legal regime of outer space with the one regulating Antarctica may lead to the applicability of the "foreign country exception" and bar a claim for a GPS-caused accident.
It seems unlikely that a court would deem outer space as the place in which the negligent act occurred, as the human operators work on the ground. Nevertheless, this possibility – although theoretical – obfuscates the full confidence in the non-applicability of this exception.
The second main provision that may jeopardize a private claim is the "discretionary

function exception", according to which the FTCA does not apply to acts based on the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved has been abused[17]. That is the most litigated provision of the FTCA, with a fifty-year history of contradictory and complicated jurisprudence. The US Supreme Court, assessing the applicability of this exception, has elaborated the so-called "Berkovitz test"[18]. It consists in two tiers: first, the judge must determine if the government employee has the ability to exercise discretion in performing his duty. If this condition is satisfied, the second tier requires the judge to determine whether the discretion was of the kind that Congress intended to protect, that is, a decision involving broad policy judgement and grounded in social, economic, and political policy. The exposure of GPS to civil liability may imply a disclosure of its technical aspects, and a consequent impairment of U.S. military security. The military nature of the system and its implications, therefore, may lead the Court to classify the GPS signal providing as a "unique government function", which is a fundamental element of the second tier of the Berkovitz test, and consequently to deem the discretionary function exception applicable.
The absence of a case law directly related to GPS signal, the technical complexity of the subject, and the military need for secrecy make any conjecture concerning the applicability of the discretionary function exception to GPS signal providing purely speculative. An airline wishing to rely on the FTCA to seek compensation from the US government, in conclusion, would face a situation of legal uncertainty, and would risk spending a large amount of money and time and fail in the end to achieve any compensation.

Perspectives for the future – regional regulation in the EU

The lack of satisfying legal instruments restates the need for an international convention, able to take into account the interests of all the stakeholders of GNSS services. The comprehensive panorama that this convention should deal with, on the other hand, is affected by an impressive array of factors that undermine the achievability of this goal.
Thanks to the upcoming operability of Galileo, the nature of the service providers will soon be differentiated: on one side there will be States operating the system under military control and entitled, from a legal point of view, to rely on the sovereign immunity defence. On the other side there will be a civilian system, operated by a private entity and exposed to ordinary civil liability.
The nature of the service will be different as well. There will be non-commercial services, made available free of charge without contractual relation as act of sovereign prerogative, facing a multi-service system, centred on the CS (Commercial Service), and delivered in a contractual form with the main purpose to generate revenues. It is evident that the policy and the interests behind these different systems are largely discordant, especially from a liability point of view. While Russia and US consider the immunity as the natural counter-weight to the gratuitous character of the service, the Galileo provider would face the need to guarantee the reliability of its commercial services, even in case of an accident, in order to make it competitive in respect to the other providers.
The last heterogeneous factor is the intrinsic multimodality of the application. GNSS is far from being utilised only in civil aviation. To take into account only the means of transport involving a transnational element, it will perform a key role in maritime transportation, rail transportation, road transportation, and in a not-too-far future, most likely, space transportation. Each of them has its own legal instruments, which

regulate liability with different structures, scope and effects, not foreseeing GNSS as a potential cause of accident. The effort to build up a comprehensive international convention on GNSS liability, capable of dealing with all these regimes and fully harmonised between each of them, is clearly a real challenge[19].
All of these factors, on the whole, have contributed to affect the ICAO decennial effort in this sense. At the present time, a global, comprehensive convention regulating all GNSS legal aspects seems very far from being realised.
A more regulated environment is likely to take place in a regional rather than global context with particular regard to Galileo, mainly because of its commercial nature. As highlighted above, the need for a legal framework is much stronger in this case, as the potential users would choose Galileo costly services only upon condition of legal certainty for compensation in case of damages.
The actual framework is constituted by Regulation (EC) No. 683/2008 "On the further implementation of the European satellite navigation programmes (EGNOS and Galileo)". Whereas it provides the basic principles for the governance of the system, no explicit provision regarding civil liability is established; a further regulation is therefore necessary in order to make the Galileo services commercially viable for future potential users.
Bearing in mind the differentiated kinds of future Galileo services, it is possible to make some consideration about the instrument to be used.
The users relying on the CS (Commercial Service) would be bound to the signal provider by a contract. Therefore, liability would be regulated by contractual provisions, ensuring an adequate level of flexibility according to the case-by-case specific legal and economical needs. To guarantee a minimal level of uniformity, reference can be made to the "Contractual Framework" developed by ECAC-Eurocontrol and presented to the ICAO General Assembly in 2004[20]. It provides a non-binding model contractual chain, with the aim to cover the relationships among different players in various stages of GNSS services, channelling the final liability upon the system operator through a system of contractual recourses.
The necessity of a binding legal instrument arises mainly for non-contractual liability, which would involve two categories of subjects: the users exploiting the OS (Open Service), whose position may be compared with GPS and GLONASS current users, and the innocent third parties. The nature of this instrument is still unclear, although the EU is putting this subject on the agenda. In the absence of a concrete chance to stipulate a multilateral convention, the most reliable tool seems to be an EU Regulation. In case of a GNSS-caused accident, it should be made applicable in a subsidiary way in respect to the existing international conventions, with the aim not to overlap, but to fill the gaps in their liability provisions and channel the final burden of the damages upon the legally liable entity. In this way the victims, facing the high complexity of the Galileo organisational framework, would be able to find immediately the appropriate body to sue, which should coincide with the system operator. The limited territorial scope of EU Regulation may be enhanced by the stipulation of bilateral agreements with single States interested in exploiting Galileo services and in implementing its own legal framework, instead of relying on national tort laws.

Conclusions

In dealing with GNSS liability, it is pointless to limit the scope of the analysis to one single economical – and legal – field of application, such as international air transport, especially with reference to the perspectives for the future. The intrinsic multimodality of this technology forces the commentator to enlarge his view, and take into account that any upcoming regime shall adopt a harmonised approach towards a

large number of factors and applications.
Despite this, it is possible to make some concluding remarks with special regard to aviation.
The current GNSS legal framework is clearly inadequate. A private entity, in our case an airline, wishing to seek compensation from a provider, would find a situation of a fundamental legal uncertainty, and would be discouraged by the likely perspective of seeing its claim barred by the sovereign immunity defence. Despite this, the system on the whole works all the same, and this legal uncertainty at the present time does not seem to threaten the spread of GNSS applications.
In the near future, the global scene is probably doomed to an enduring legal fragmentation. While the US and Russia are interested in maintaining a substantial legal vacuum in order to avoid dealing directly and openly with the issue of liability, the EU is expected to enforce a legal framework for Galileo and its commercial and non-commercial services, in the most likely shape of a combination of a non-binding contractual framework, Regulation and bilateral agreements. ICAO's role, for the moment, seems irremediably set aside.
In the long run, a comprehensive international convention is surely desirable, but its achievement strongly depends on the US and Russian political will. As long as their State duopoly is in force, a significant change of the current conditions can be hardly envisaged. The forthcoming competition of Galileo and further GNSS systems like the Chinese Beidou-2/Compass, and even more the introduction of a business-related logic, could potentially unblock the situation, and bring a general trend of commercialisation and a subsequent need for a harmonised global regulation. The trigger of this phenomenon will be largely influenced by the success of Galileo, whose proportion, in the current situation, is very hard to predict.

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[1] Attachments to ICAO State Letters LE 4/49.1 – 94/89 and LE 4/49.1 – 96/80. The operative part of the United States letter to the President of the ICAO Council dated 1 October 1994 provides:
"[T]he United States intends subject to the availability of funds as required by United States law, to make the Standard Positioning Service of GPS available for the foreseeable future, on a continuous, worldwide basis and free of direct user fees. This service…will be available…on a non-discriminatory basis to all users of civil aviation, will provide horizontal accuracies of 100 metres (95 per cent probability) and 300 metres (99.99 per cent probability). The United States shall take all necessary measures to maintain the integrity and reliability of the service and expects that it will be able to provide at least 6 years notice prior to termination of GPS operations or elimination of GPS-SPS."
[2] KOTAITE, *ICAO's Role with Respect to the Institutional Arrangements and legal Framework of Global Navigation Satellite Systems (GNSS) - Planning and Implementation*, Annals of Air and Space Law, 1996 Vol. XXI Part. II, p. 200-203.
[3] KAUL, *Liability Implications of the Use of Global Navigation Satellite Systems 8GNSS) for Communication, Navigation, Surveillance/Air Traffic Management /CNS/ATM) in Civil Aviation .- with Special Focus on India*, Annals of Air and Space Law, 2010, Vol. XXXV, Part I, p. 427-430.
[4] Art. 20, Warsaw Convention. It is worthy to notice that, in practice, this clause has been hardly invoked. It still constitutes, however, a potential threat to passenger's rights in the so far not legally tested case of GNSS failure.
[5] Art 24, Warsaw Convention; Art. 29, Montreal Convention; Art. 9, Rome Convention.
[6] This conclusion has a general validity. In a considerable amount of cases, it would be affected by status of ratification of the Treaties and by each national case law regarding the interpretation of the principle of exclusivity.
[7] See HENAKU, *The International Liability of the GNSS Space Segment Provider*, Annals of Air and Space Law, Vol. XXI, Part. I, 1996.
[8] The problem is linked to the missing definition of "space activities" in the space treaties. According to the majority of the doctrine, it is convenient to adopt a broad interpretation, and consider a "space activity" any human activity that takes part wholly or partially in outer space. See GEHRARD, in HOBE, SCHMIDT-TEDD, SCHROGL, GOH, *Cologne Commentary on Space Law, Vol. I*, Carl Heymanns Verlag, 2009, p. 109.
[9] The binding efficacy of this kind of instrument seems to find a considerable legal ground in the Vienna Convention on the Law of Treaties. "States may express their consent to be bound by an "exchange of let-

ters/notes, each of the parties having in their possession one letter or note signed by the representative of the other party. In practice, the second letter or note, usually the letter or note in response will typically reproduce the text of the first. In a bilateral treaty, letters or notes may also be exchanged to indicate that all necessary domestic procedures have been completed." Art.13, Vienna Convention on the Law of Treaties, 1969. For a further analysis of the topic, see AUST, *The Theory and Practice of Informal International Instruments*, International and Comparative Law Quarterly, Volume 35, 1986.

[10]This category has to be read in opposition to *acta iure gestionis*, that are acts performed by States in then same fashion and on the same footing as private persons, for example in the subscription of commercial contracts. In this case, no immunity can be invoked for civil claims.

[11]For an overview of current international immunity rules, see *Convention on the Jurisdictional Immunities of States and their Properties*, codified by the International Law Commission and adopted by the UN General Assembly on 2 December 2004, A/Res/58/74.

[12]28 U.S.C. §§ 2671-2680.

[13]28 U.S.C. § 2680 (k).

[14]The Operational Control Segment consists of the Master Control Station (MCS), located at Schriver Air Force Base in Colorado Springs, Colorado.

[15]EHRHART, *A Technological Dream Turned Legal Nightmare: potential Liability of the United States under the Federal Claims Tort Act for Operating the Global Positioning System*, 33 Vand. J. Transnat'l L. 371 2000, p. 390.

[16]See Art. IV, The Antarctic Treaty, 1959 and Art. II, OST.

[17]28 U.S.C. § 2680 (a).

[18]The "two-pronged Berkovitz test" was firstly delineated by the Court in *United States v. Varig*, but further elaboration was made in *Berkovitz v. United States* and *United States v. Gaubert*. Consequently, there is no uniformity in the doctrine as concerns the name of the test. See EHRAHRT, supra note 42, p. 416, note 323.

[19]VON DER DUNK, *The European Equation: GNSS = Multimodality + Liability*, Haftungsrecht Im Dritten Millennium – Liability in the Third Millennium, 2009, p. 232.

[20]Although recognised by ICAO in Assembly Resolution A35-3 "*A Practical Way Forward on legal and Institutional Aspects of Communication, navigation, Surveillance/Air Traffic Management (CSM/ATM) Systems*" in 2004 (see ICAO docs. A35-WP/75; A35-WP/125), the "Contractual Framework" has been later considered by the General Assembly an exclusive responsibility of ECAC States and no more a task of ICAO. The downgrading of its priority from 1 to 3 means that ICAO has substantially given up this project. BOLLWEG, *GNSS Liability by International or European Union Law?*, Zeitschrift für Luft und Weltraumrecht – German Journal of Air and Space Law, 2010, p. 551-552.

SPACE

GLOBAL UNITED NATIONS EVENTS IN 2015 SET TO PROVIDE STRONG MOMENTUM FOR UNOOSA IN PROMOTING OUTER SPACE FOR SUSTAINABLE DEVELOPMENT.

Simonetta Di Pippo *

As the international community works to finalize the Sustainable Development Goals and formulates a global development agenda for the post-2015 period, more and more attention is being given to the contribution of space science and technology for sustainable development. Establishing or strengthening sustainable and standards-driven spatial data infrastructures at national and regional levels is recognised as one essential component for achieving development goals and objectives.

The outcome document of the United Nations Conference on Sustainable Development (Rio+20), entitled "The future we want", recognised the importance of space-technology-based data, in situ monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations.

The post-2015 development agenda, borne out of the expiration of the Millennium Development Goals (MDGs) in 2015, will require effective, enhanced and innovative tools to support its implementation. Among the tools are those offered by space science and technology, which could act both as an enabler and as a catalyst for countries' efforts in progressing toward internationally agreed development goals and for sustainable development.

The United Nations Office for Outer Space Affairs (UNOOSA) works to promote international cooperation in the peaceful use and exploration of space, and in the utilisation of space science and technology for sustainable economic and social development. The Office assists any United Nations Member States to establish legal and regulatory frameworks to govern space activities and strengthens the capacity of developing countries to use space science technology and applications for development by helping to integrate space capabilities into national development programmes.

Space technology provides the means that can transform traditional approaches in virtually any sector of economy. The aim of the present article is to highlight the areas where UNOOSA works towards promoting the use of space-based data, tools and services for global sustainable development.

UNOOSA and Sustainable Development

The United Nations Inter-Agency Meeting on Outer Space Activities, UN-Space, convenes annually under the leadership of UNOOSA and serves as the focal point for inter-agency coordination and cooperation in space-related activities, and has done so since 1975. Its aim is to promote synergies on efforts related to the use of space technology

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and applications in the work of United Nations entities and for the goals of the Organisation. The meeting issues a report on its deliberations for the consideration of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), the primary UN body that deals with peaceful uses of space and international cooperation in outer space.

UNOOSA and COPUOS have been engaged in contributing towards the MDGs since these were adopted at the turn of the century. It was during the 2004 UNISPACE III+5 review that the Committee identified specific synergies between the recommendations of UNISPACE III, the Third in a series of Global Space Conferences, and actions called for under the Millennium Declaration. The Committee identified specific actions to be undertaken to support the overarching global agendas for sustainable development.

UNOOSA for Emergency Response and Disaster Risk Reduction

When a disaster strikes, situational awareness is essential. Satellites provide reliable and rapid communication, observation and positioning tools, especially when crucial on-the-ground infrastructure is damaged. The information satellites gather can also help anticipate or minimize the risks of disasters such as earthquakes, floods, landslides, fires or tsunamis. Escalating natural disasters threatens sustainable development initiatives.

The United Nations recognizes the importance to access and use space-based information to both reduce disaster risks and improve disaster response, particularly in developing countries. However, many countries still do not have appropriate access to such information in this regard. In 2006, the General Assembly therefore established the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). The programme is implemented by UNOOSA. UN-SPIDER's mandate is to "ensure that all countries and international and regional organizations have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle".

UN-SPIDER and disaster response

In disaster situations, disaster managers are in the need of rapid and reliable information on the geographical extent of the event, the impact on people, and the degree of damage to housing and other private and public infrastructure. Responders also need to assess the status of critical assets such as telecommunication networks, roads, shelters, informal assembly points and health facilities. Satellite data makes it possible to assess and map the extent of events such as floods, landslides, and the flow of damage debris or forest fires. In addition, through a comparison of high-resolution images ideally taken just before and after a disaster, Earth observation experts can detect areas affected or destroyed by the event. Unfortunately, in many countries emergency responders do not know how to obtain or do not have access to such information. UN-SPIDER acts as a bridge between the disaster managers and the space community in order to help that valuable information reach those who need it. UN-SPIDER does this in two ways.

First, during an emergency situation UN-SPIDER supports emergency responders such as civil protection agencies through the request for the activation of emergency response mechanisms such as the International Charter on Space and Major Disasters, the Copernicus Emergency Mapping Service, Sentinel Asia or Servir. UN-SPIDER also works directly with other partners from the space community to request imagery for civil protection agencies that have to respond to disasters. Through its Knowledge Portal (www.un-spider.org), UN-SPIDER facilitates the access to relevant data from different sources including reference datasets, rapid mapping products and crowd-sourced information.

Second, as part of its Technical Advisory Support activities, UN-SPIDER implements trainings and other capacity building efforts in requesting countries. During the training courses, participants also learn how to activate the different emergency mechanisms mentioned above. UN-SPIDER works closely with the International Charter on Space and Major Disasters to support their recently-adopted Universal Access initiative. Through these activities UN-SPIDER supports countries to be better prepared for emergency situations.

A strong network, in which each one knows what the others are doing, is decisive in emergency situations. UN-SPIDER is therefore also an active member of the International Working Group on Satellite-based Emergency Mapping (IWG-SEM). The group supports disaster response by improving international cooperation in satellite based emergency mapping, for example by providing Emergency Mapping Guidelines and by establishing harmonized tools to rapidly exchange information on the areas of interest even before the tasking of satellites. More information on the IWG-SEM is available via www.iwg-sem.org, which is hosted on the UN-SPIDER Knowledge Portal.

Post-2015: World Conference on Disaster Risk Reduction framework and what it means to UNOOSA

A follow-up framework to the Hyogo Framework for Action (HFA) will be adopted by the global community of nations during the World Conference on Disaster Risk Reduction (WCDRR) in Sendai, Japan, in March 2015. This new framework will build on and strengthen the HFA and previous international frameworks and strategies and aims to guide international and national efforts over the next 20 years.

UNOOSA/UN-SPIDER together with its partners from the space community has started a global effort to contribute to the new Post-2015 Framework for Disaster Risk Reduction. Knowing that satellites provide an indispensable source of data to support disaster risk reduction and seeing that the potential is not fully exploited, especially in developing countries, the group promotes the use of space-based information within the new framework now being defined. Satellite information will serve two aspects of the framework.

First, satellite information is important to support the implementation of the new framework at local, national, regional and global level. Earth observation data help to periodically assess disaster risks including vulnerability, exposure and hazard characteristics. Space-based data is also needed for risk modelling and assessment, monitoring, and early warning. Risk is unevenly distributed across continents, regions and countries. Disasters do not stop at national borders. National datasets from different countries are not always comparable. Satellite-derived datasets provide a basis for

spatially-consistent information to measure and understand the uneven distribution of risks and losses. In addition, satellite-derived datasets facilitate the large-scale assessment of risk exposure. All of this leads to improved understanding of disaster risks, which is one of the four priorities for action as stated in the Zero draft of the Post-2015 framework for Disaster Risk Reduction. In addition, space-based information plays a role in enhancing preparedness for effective response, which will be another priority for action in the new framework. The near-real-time monitoring capacities of Earth observation systems provide a wealth of timely information for early warning systems covering the whole globe.

Second, satellite information is also important to support the monitoring process to track the progress made in reaching the targets, goals, and outcome of the new framework. While the final set of indicators is still under negotiation, it is already clear that Earth observation can contribute to monitoring important aspects. Many underlying drivers of risk are linked to land cover, for example deforestation, urbanization or water stress. Mapping land cover and detecting land cover changes are core disciplines in remote sensing. Regular updates of land cover information in combination with hazard information can be useful to assess changes in hazard exposure. Remote sensing can also be applied to estimate for example the number of hectares of crops lost due to a disaster, thus contributing directly to the monitoring of the drafted outcome of the new framework, namely the reduction of disaster losses.

The added value of using satellite-derived Earth observation data and other space-based tools and applications to support the new framework is clear: satellite imagery is normally georeferenced, thus allowing geospatial analysis; it covers large areas at once and provides data coverage and archives for the whole globe; the imagery archive containing data for about fifty years allows time series analysis; and imagery like Landsat, CBERS, MODIS and Sentinel-1 is available free of charge and easily accessible via the web. Still, in the draft guidance on the monitoring process published by UNISDR in June 2014, Earth observation is not specifically mentioned as a possible data source. UNOOSA (through UN-SPIDER) with its partners therefore continues its efforts to raise awareness among national governments on the added value of using Earth observation for disaster risk reduction.

As a follow-up of the WCDRR and as a means to pave the way for further action towards the use of space-based information for the post-2015 development process, UNOOSA/UN-SPIDER together with the German Aerospace Center (DLR) will organize the United Nations/Germany International Conference on Earth Observation – Global Solutions for the Challenges of Sustainable Development in Societies at Risk. The conference will take place in Bonn, Germany, from 26 to 28 May 2015. A dedicated session on the post-2015 framework for disaster risk reduction will serve as a platform for networking and planning further steps towards the institutionalization of space-based information in countries to support the implementation as well as the monitoring of the new framework.

UNOOSA and Climate Change

In November 2014, the Intergovernmental Panel on Climate Change (IPCC) put forward a synthesis report stating that with a certainty of 95% the observed trend in global mean temperature over the past 100 years were unlikely to be entirely natural in origin. "A level at which to not act collaboratively and in a timely manner would fly in the face of both reason and responsibility," as Christina Figueres, Executive Secretary of the UN Framework Convention on Climate Change put it. Climate change poses a great threat to sustainable development by affecting vital areas of economic growth and well-being including food, energy, natural resources, wildlife or water. However, to respond to these challenges requires a solid knowledge of the changes and the trends in question. The better we can monitor and track the changes on our planet, the better we can mitigate them and lessen adverse effects. Space-based Earth observation contributes significantly to fill this knowledge gap by providing valuable and highly reliable input for efforts concerning both climate change mitigation and climate change adaptation.

Satellite data provide large and detailed picture of changing conditions due to climate change and thus offer a sound scientific base for decision-making. Used in combination with ground data in recent decades, satellite technologies have tremendously improved allowing us to generally access more space-based resources than ever and to build long-term data archives. Satellites can monitor changes in our atmosphere, our oceans and on land with great precision. This includes changes in polar ice shelves and glaciers, snow covers, soil moisture, deforestation, temperature rise, sea surface salinity, floods, droughts, storms, sea level rise or industrial or agricultural land use. Satellites including space-based Earth observation and Global Navigation Satellite Systems (GNSS) can also help assess the risks of climate-related extreme weather events and deal with losses and damages by capturing the exact extent of the impacts. Most importantly, satellites do not only capture the current situation, they also provide the relevant input to model future developments and to learn from the past.

Cooperation within the United Nations on Climate Change

The different entities within the UN system work hand in hand to help Member States make efficient use of satellite data in the context of climate change to strengthen climate change mitigation and adaptation policies and actions on the international, regional and national level through UN-Space. In 2011, UN-Space (then IAM) included an open session for Member States focused on "Space and Climate Change".

2015 – A decisive year for sustainable development

In 2015, a new global agreement on climate change will hopefully give momentum to the efforts of climate change mitigation and adaptation. This agreement, which should enter into force in 2020 as the successor of the Kyoto Protocol, aims to have legal force and be applicable to all Parties bringing together the various binding and non-binding arrangements that currently exist under the UN climate convention. Earth observation will be a determining factor in monitoring the progress of reaching the agreed goals. While it is not likely that a common set of binding indicators will be established, UNOOSA aims to raise awareness of the usefulness of space technologies among United Nations Member States giving them the proper incentives to institutionalise the use of these technologies in order to reach the agreed mitigation and adaptation goals and to continuously monitor progress.

In May 2015, UNOOSA's UN-SPIDER programme will, as mentioned above, organise an international conference on Earth observation in Bonn, Germany focusing on the three major agreements that will take shape in 2015: the post-2015 development agenda including the Sustainable Development Goals, the post-2015 agreement on disaster risk reduction and the new agreement addressing global climate change. A full session at the conference will be dedicated to the usefulness of Earth observation for climate change by shedding light on good practices, new technological developments and success stories of the use of space technologies for climate change mitigation and climate change adaptation in Member States.

The 2015 deadline for the Millennium Development Goals is fast approaching and the UN and its Member States are galvanising their efforts for the post-2015 development agenda in a process initiated at the Rio+20 Conference on Sustainable Development, as noted above. This process will culminate with set of new sustainable development goals (SDGs). UNOOSA has a unique opportunity to mobilize support and commitment at the global level for increasing the role of space-based technology and information as an enabler of the goals and objectives of the post-2015 development agenda. Through its capacity building activities, UNOOSA can ensure that equality in the fundamental access to space-derived information and its use in supporting decision making at all levels is guaranteed in the work towards global sustainable development.

2015 for UNOOSA

The year 2015 will be important globally on various fronts and key milestones will define the long-term vision of governments and of the international community. The United Nations as a system is leading or supporting the preparation of those milestones and at least three of them will re-define the work of UNOOSA. Those three major related events are:

- **World Conference on Disaster Risk Reduction** (WCDRR, Sendai, 03/2015)will produce a new framework for action on disaster risk reduction in which States will define their goals and agree on indicators of progress. This framework will replace the Hyogo Framework for Action set in 2005 but will now have a much longer term vision, up to probably 20 or even 25 years. UNOOSA with UN-SPIDER will integrate this new framework into its vision and plan of work.
- **United Nations Summit on Sustainable Development** ("SD", New York, 09/2015)in September will produce an agreement of UN Member States on their common goals for sustainable development and will also define a set of indicators to measure their progress. This will replace the Millennium Development Goals and will thus ensure continuity in the principles guiding the work of the United Nations. The Committee on the Peaceful uses of Outer Space (COPUOS) has already prioritised ensuring that the long-term sustainability of outer space be recognised as an integral component of sustainable development and the role of space-based tools and technology in measuring those indicators and reaching the sustainable goals will continue to be a priority in the work of the Committee and of UNOOSA.
- **21st Conference of the Parties on Climate Change** ("UNFCCC", Paris, 12/2015) raises many expectations in the international community for a new long term commitment from the different groups of countries active in the debate on climate change. Many United Nations entities are active in this do

main, including on intensifying the use of satellite-based tools and data, such as the United Nations Education, Scientific and Cultural Organisation (UNESCO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organisation (FAO), the World Health Organisation (WHO), the World Meteoro logical Organisation (WMO) and others. Through UN-Space, UNOOSA is facilitate ing the coordination within the UN system and should lead the promotion of space-based tools and technology for the monitoring of the impacts of climate change and help streamlining the use of those tools in the decision-making processes. UN-SPIDER is also now planning to coordinate further with those agencies and others to bring knowledge and experience in the management of disasters related to extreme weather events, which are more and more linked to effects of climate change in many regions of the world. UNOOSA will need to integrate particular elements of the emerging climate change framework into its efforts and those of other UN-Space entities.

These major global United Nations events will provide a momentum for UNOOOSA to build upon its work promoting the use of outer space for fulfilling UN goals. Additionally, alongside these events, UNOOSA is organising the aforementioned International Conference on Earth Observation: Global solutions for the challenges of sustainable development in societies at risk with the German government in Bonn, Germany in May 2015 and, in November 2015,aHigh Level Forum on 'Space as a driver for socio-economic sustainable development' with the government of the United Arab Emirates which aims to drive debate on the role of space science and technology in fostering global development. In total, the work of UNOOSA in 2015 will consolidate its position as a UN Office in:

- Enhancing its role as the main entity within the UN system focusing on the promotion of the use of space-based applications;
- Facilitating the links between the space community and end-users of space-based products, in particular government ministries and agencies leading these key areas at the national level;
- Facilitating the definition of agendas of work within the space community on the development of procedures focusing on using space-based applications targeting these three areas of development and facilitating potential synergies among developers of such applications;
- Advocating use of and universal access to space-derived geospatial data;
- Partnerships among members of the space community and those of the climate change, disaster-risk reduction, and sustainable development communities.

SPACE

SPACE BLOCKADE: A THREAT TO SPACE ACTIVITIES?

Alfredo Roma*
Roberto Mulas**

On 20th November 2014, the BBC reported that observers say that Russia may be testing a satellite capable of chasing down other orbiting spacecraft. Such technology could have a wide variety of uses, including repairing malfunctioning spacecraft, but also to destroy or disable them. In fact, the Kosmos 2499 satellite was launched on 23rd May 2014 as part of a seemingly routine mission to add new Rodnik communications satellites to an existing constellation, but then it was chased down. The Russian mission follows similar on-orbit tests carried out by the US and China this year. This possible test opens new scenarios for future space activities.
Since the launch of Sputnik I in 1957, space activities rapidly developed during the Cold War as a demonstration of military power between the two blocks represented by the United States and the USSR. Nowadays, they are more like a scientific and technological competition among many countries, with the participation of international organizations and private companies. In order to regulate the exploration and use of outer space, the international community has drafted and signed various international treaties[1] under the guidance of the United Nations (UN).
In addition to the traditional competitors - the United States and Russia - other actors such as the European Space Agency and its members, primarily France, Germany, Italy and the United Kingdom, have been playing an increasingly important role. The European Union started only in the mid-1990s to be involved in space activities as regulators[2]. In the last several decades, also India and China have developed consistent space activities. One of the key provisions of the Outer Space Treaty (OST) concerns the responsibility for space activities. Article VI, OST, states in particular (although there is still substantial discussion on what it precisely means) *"States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty."*
The satellites can be distinguished according to their payload to be used for scientific purposes such as astrophysics or meteorological satellites, TLC satellites, navigation and Earth observation satellites. In addition, the orbiting stations play an important role in space activities.
All these satellites can be used for civil or military purposes as long as defensive, i.e. in the exercise of self-defence or following a United Nations mandate according to Article 51 of the UN Charter[3].
There is no doubt that space infrastructure contains in itself the possibility of a dual use, such as satellites for navigation or positioning, Earth observation, telecommunications and remote sensor devices.

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Land, sea and air blockades: case history

The world history of the last five centuries offers many cases of land or naval blockades to isolate a country from the rest of the world and force that country to accept the settlement of an international dispute decided by other countries.
Let's take a case in our recent history: on 24th June 1948 the USSR blocked all the roads and railways to West Berlin. The Soviets wanted to put pressure on West Germany, which later became the Federal Republic of Germany, to make it pay war reparations, although this had not been agreed yet. The American President Harry Truman made strong opposition; Stalin reacted transforming the Soviet occupation zone of Germany into a communist independent State: the German Democratic Republic.
The blockade was made even heavier by the fact that the Potsdam agreements were unable to establish a transit right through the Soviet sector of Berlin. The allied forces excluded to force the blockade with armoured land means and decided to establish an airlift. This began on June 25, 1948 and lasted 462 days, resulting in the evacuation of many citizens in need of medical care. Although the Soviet Union had removed the blockade from 12 May1949, the airlift continued until September 30th in order to permit the storage of sufficient basic necessities in the city.
Since the end of World War II, the blockade of airspace with the establishment of a no-fly zone has been the most common way to isolate a country or a region in a crisis area. The airspace blockade has become effective thanks to modern air traffic control system. One of the most known cases is that of Nagorno-Karabakh region whose airspace closed many years ago by Azerbaijan as retaliation against Armenia; another recent case is the no-fly zone established over Syria.
Before the development of aviation, the most common measure to isolate a country was the naval blockade, aimed at preventing entry and exit of vessels to and from its ports. The Declaration of Paris, signed on 30th March 1856[4], putting an end to the Crimean War, governs the naval blockade. In agreement with the provisions of the Geneva Convention, it requires: 1) the country implementing the blockade must inform other non-belligerent nations in advance, clearly indicating the geographical area subject of the blockade[5] ; 2) the impartiality of the naval blockade against non belligerent countries; 3) the ability to capture any merchant vessel that violates the blockade with attached referral to a court of prey; 4) the ability to attack any enemy merchant vessel that will resist the blockade; 5) an obligation on the part of the blockade actuator to allow the passage of cargoes containing basic necessities and medicines for the local population in accordance with Article 54 § 1 of the 1977 Protocol I, Additional to the Geneva Conventions of Humanitarian Law of 1949[6].

Preliminary Considerations

The right of exploration of outer space is based on its peaceful use as stated by Article III of the Outer Space Treaty (OST)[7] and in the 1962 United NationsDeclaration[8]. The prescription of the OST cannot be regarded as the definitive exclusion of the military use of outer space, as confirmed by the UN Charter which prohibits the use of force but also creates two major exceptions: self-defence or fulfilment of a UN mandate to use force, as mentioned here above. The OST provides a stricter regime for the moon and other celestial bodies, especially concerning nuclear weapons and weapons of mass destruction[9]. The study commissioned by the US Secretary of Defence Rumsfeld is based on these principles, developing a scenario in which the strategic imperative for the United States of America was the need to keep the nation safe from a cosmic Pearl Harbour[10]. The fear was linked to the increasing dependence

of the United States armed forces from the satellite technology, such as GPS, the possession of which could deliver an advantage against the United States into the hands of a dangerous opponent. During the first Iraq war, Iraqi forces corrupted the GPS signal addressing an American battalion towards an area where they had prepared an ambush. The fear grew as it became clear that the United States itself was interested in acquiring this type of advantage against less powerful rivals during conflicts[11]. On the latter point it is important to consider that the International Court of Justice specified that the International Humanitarian Law is also applicable since 1996 to new technologies[12], although this opens the debate on how to implement it[13]. Moreover, several concepts of the *jus in bello* may be applied as: principle of distinction, principle of military target, principle of proportionality[14].

The space blockade

The Space Blockade is a deliberate interruption of operations of critical space infrastructure set up to ensure the continuity of government action and business activities when ground infrastructure cannot be used; these interruptions may generate a domino effect on the classical geopolitical domains: land, sea and air. The space blockade can be procured in three ways: 1) by satellites against other satellites in orbit; 2) by satellites activating an engagement process towards ground infrastructure; 3) by ground infrastructure able to hit those satellites allowing the interdependence of ground infrastructure; 4) by any kind of weapons able to attack a ground-based space critical infrastructure[15].
There are two forms of blockade: one is the physical interruption obtained by the destruction of the entire or part of an infrastructure; the other is the electronic blockade of communications through jamming, spoofing and interferences directed at space signals and transmissions. Each of them has different legal parameters and consequences depending on the applicable set of rules: space law, air law, private law, criminal law, or Law of Armed Conflict (LOAC), also referred to as the law of war or international humanitarian law.
The conduct of military operations is governed by international law, including LOAC. All nations are obliged to train their forces to comply with LOAC and with other provisions of international law that impact upon military operations. The San Remo Handbook[16] is intended to facilitate the creation of Rules On Engagement (ROE) to provide for the judicious use of force in compliance with international law. Nations are also bound by the Geneva Law and The Hague Law. The San Remo Handbook procedures define the engagement as "*Declared attack on hostile forces and other military objectives", while "Attack is an act of violence or computer network attack in which there is a reasonable expectation that death, bodily harm or damage to property may occur".*
The San Remo Handbook also provides guidance for operations in outer space, which is beyond the sovereignty of any nation and can enjoy freedom of equal access and use of it. ROE for space recognises that: 1) it is prohibited to place conventional weapons on the moon and celestial bodies and to station nuclear weapons and other weapons of mass destruction anywhere in outer space; 2) no nation can claim jurisdiction or sovereignty over any portion of outer space; 3) the use of satellites for surveillance, communication and navigation for military purposes, over-flight by missiles, and the stationing of conventional weapons on satellites are not prohibited activities; 4) the determination of where national airspace ends and outer space begins has not yet been precisely established.

ROE should also consider: 1.interferences with Communication Satellites, in particular the rules related to Radio Regulatory Provisions stated by Radio Regulations Board of ITU; 2.neutralization/destruction of satellites, in order to prevent: 2.1. access to weapons in space; 2.2.space war manoeuvres; 2.3. use of space for send/receive information useful for planning military actions; 2.4. Space Traffic Management in order to reach a fair and equitable use of outer space during peaceful times as well as during conflict projection in outer space[18].
In outer space it is particularly difficult to identify the spacecraft performing an attack as information on spacecraft can only be found in the UN Register of space objects. The Convention on the registration (Article 2 § 2) requires that all States must register space objects[19] adding information such as: 1) the name of the launching State; 2) the name and registration number; 3) the date and place of the launch; 4) the basic orbital parameters (nodal period, inclination, apogee, perigee); 5) the functions of the object in question[20]. It should be considered that the capacity of a State to know the position of the satellite is derived from the type and number of sensors used by the software that will calculate its future position[21]. One of the problems of the militarization of space is that an opponent can, with the help of satellites, collect images to determine the facilities to prevent the engaged State fromsetting up a defence strategy.

The separation between airspace and outer space

This is a key point for all those activities than may take place between airspace and outer space, like a space blockade. On this matter, there is an on-going discussion on where the exact boundaries between airspace and outer space are. In the 1950s, Theodor Von Karman proposed a physical approach: the demarcation between air and outer space is identified where an aircraft will not find sufficient aerodynamic lift to sustain the flight which, based on the calculation of Von Karman, resulted in approximately 84 km. For the moment, only Australia has established that a space object is such when it is launched beyond the distance of 100 km above mean sea level. The same altitude of 100 km was chosen when launching the Ansari X prize. These two examples have no legal value but they are an interesting indication as to where outer space is considered to begin.
A basic important analysis has been made by Frans Von Der Dunk in his article “Beyond what? Beyond Earth orbit?”[22]. It is a semantic analysis, which starts from the semantic interpretation of the Registration Convention under the Vienna Convention on the law of the treaties. Combining the geographical term “beyond” with the non-geographical term “Earth orbit”, the second term also takes on a geographical meaning. Therefore, the key phrase of Article II (1) of the Registration Convention cannot be logically interpreted otherwise: ‘beyond Earth orbit’ is to be read as ‘above a certain altitude, somehow referred to by the term ‘beyond Earth orbit’’, because this conforms to the ordinary meaning of ‘beyond’ whereas any other interpretation of the concept would make no sense in the context of the Registration Convention. Geographically speaking, concludes Von der Dunk, ‘Earth orbit’ may indeed refer to anything between just over a 100 kilometres and almost 40,000 kilometres from the earth’s surface.
However, a distance will have to be chosen on the basis of an attempt to synthesize the existing theories on the subject into one single legal theory, ultimately perhaps confirmed by an international convention recognising such demarcation regime.

Threats, risks and vulnerabilities

The main threat to consider is the presence of intense competition between nations belonging to NATO and the BRICS countries (Brazil, Russia, India, China, South Africa) in space activities. The increased number of space-faring nations increases the risk of transposing geopolitical tensions into outer space. The current landscape sees in fact,that the future scenario of outer space tends to be pretty anarchicwhere vulnerability, mainly electronic, can be used to attempt to space assets by the following methods: 1) direct electronic jamming and spoofing of Low Earth Orbit (LEO), Medium Earth Orbit (MEO) and Geostationary Earth Orbit (GEO) signals; 2) attack on ground stations communicating with satellites with conventional weapons; 3) laser dazzling and blinding, considering that it requires an energy 10,000 times higher to hit the satellite in orbit GEO than in orbit LEO; 4) attack on radiofrequencies by high energy microwave weapons to create thermal failure (while it is easy to attack a satellite in LEO,it is instead extremely difficult to attack a satellite in MEO or GEO orbits); 5) use of high-energy laser to cause thermal failure primarily to satellites in LEO; 6) use of ASAT (Anti-Satellite Weapons) with a fragmentation warhead and proximity fuse against satellites in LEO; 7) microsatellites with proximity fuse; 8) nuclear detonations at around 100 km altitude against satellites in LEO[23].
In any case, there will be the risk that small manoeuvrable satellites for inspection can be used as space weapons[24]. At that point, risk mitigation strategy will require puttingsome satellites for space surveillance on orbit[25] . Finally, the actions taken to defend the space infrastructure could lead in practice to a sort of outer space militarisation[26].

Space Blockade and duality of target

In the event of conflict operations, planning goes through the process of designation. The Advisory Opinion of 8th July 1996 of the International Court of Justice[27] requires that, in the pre-attack, the planner, in accordance with international humanitarian law, must be able to prove that the potential target is neither civilian nor with civilian features, but exclusively a legitimate military target. The attack should be limited to military targets which by type, nature, location, purpose or use, make an effective contribution to military action and whose destruction or neutralization offer a military advantage[28]. By exclusion, all targets that are not considered military are automatically civilian. However, the planners of an attack cannot predetermine if the target to be destroyed would cause damage to life and property of civilians. Given the current financial difficulties, the majority of States have put dual-use infrastructure in orbit, which means that despite being operational for civilian purposes such infrastructure may also have military functions, with the relevant risk of engagement in case of conflict.

Space Blockade: scenario assumptions

We suppose that the tensions existing in the multipolar world have been inherited from the previous bipolar structure. Besides scientific research, the space sector is essential for the use of goods produced by traditional sectors such as the food chain, energy, transport, and finance, becoming therefore usable for economic warfare too.Communications, navigation, earth observation, weather forecast, natural disaster prevention, telemedicine, all depend on space assets. The era of economic and financial war is distinguished from the others by way of the process of technological

cooperation; the economic war could develop as follows: a hegemonic nation engages a TLC satellite of a regional power with microwave emitters and causes damage. The now disabled engaged satellite cannot convey information to the infrastructure used to manage the sector dependent on the satellite service. A domino effect will be then produced among all satellites depending on the service offered by the engaged satellite, paralyzing all associated infrastructure, putting the whole system of the country on its knees, with the immediate effect of a '*space embargo*' against space-related infrastructure, and the risk of war.

Space Blockade and Physics of Space

The Space Blockade can also be planned from the Earth's surface to outer space with ASAT missiles to take advantage of a limiting factor for strategic uses due to the physics of space: the destruction of a satellite will create a cloud of debris. Considering that many activities now depend on space assets, a country with a limited military force would take advantage of the dependence of the superpower on space assets for an attack that would have major domino repercussions because the cloud of debris would create serious problems to the superpower. In this case, we would be facing an indiscriminate attack with consequences for properties and civilians. There is an analogy with the rules of maritime war. In fact, similarly, the use of anti-ship mines and torpedoes is a specific risk to civilian properties that might collide with mines and torpedoes. In order to avoid the problem, there must be a guarantee that such instruments, after a certain period of time, would auto-disarm[29]. Debris derived from the object is a serious risk to any spacecraft forced to go through the saturated area, similar to minefields. In addition, an extensive debris field might violate the principle of not causing widespread damage to the environment in the long term. For this reason, when planning an attack all the potential repercussions, including the necessity and proportionality in pursuing the objectives that can legitimately be engaged, must be considered.

Space Blockade and the current international legislation

During the sixties and the seventies, starting from lessons learned in other areas, various agreements were adopted to avoid weapon systems being installed on board satellites. The first of these agreements was the Moscow Partial Test Ban Treaty (1963), which evolved into the Comprehensive Test Ban Treaty A/RES/50/245[30]. The 1971 INTELSAT Agreement established an IGO called "INTELSAT".However, the Agreement was rather fundamentally amended in 2011, so as to create a private operator "INTELSAT" and a residual IGO as overseeing entity, taking the place of INTELSAT; that residual IGO is referred to as "ITSO"[31].
These agreements, relating to Article IV of the OST, prevent the introduction of nuclear weapons, or any other kind of weapon of mass destruction, into Earth orbit. They also prevent the installation of such weapons on celestial bodies, or putting them in outer space in any other manner reproducing de facto the prohibition of Article 1 of the previously mentioned1963 Treaty of Moscow on the prohibition of nuclear tests in the atmosphere, in space and underwater. To implement the disarmament, the final document of the first special session of the United Nations General Assembly on disarmament, specified that negotiations should precede the debate in the Conference on Disarmament (CD)[32], which since 1985 has established an ad hoc committee for the*Prevention of an Arms Race in Outer space (PAROS),* such as the legal protection of the satellites of the space nuclear power systems and various provisions aiming at strengthening the effectiveness of instruments of mutual trust (*Confidence-Building*

Measures).
The United States opposed these agreements, preferring bilateral talks with the USSR on the grounds that multilateral bodies are appropriate for control practices. However, in 2008 the Russian Federation, on the occasion of the Conference on Disarmament, presented a draft (PAROS) treaty by which States commit to refrain from placing objects carrying weapon systems in orbit, installing weapons on celestial bodies and the use of force against space objects.
The draft PAROS treaty improves the contents of the OST aiming to preserve outer space for peaceful purposes and reaffirming the ban on the use of space weapons and their technological developments related to the development of ASAT systems, thereby preventing any country from gaining a military advantage in outer space.
Today, despite the stalemate of the Conference on Disarmament, China and Russia have continued negotiations in the field of PAROS. In June 2002, they presented a joint working document on the elements that could lead to a future international agreement on the prevention of the deployment of weapons in orbit. In 2003, the Resolution 58/36[33]laid the foundations for the subsequent resolution on PAROS (Res. 59/65 of2004)[34]. On 16th August 2005, during a meeting hosted by China and Russia, a Resolution on Transparency in Confidence Building Measures (TCBMs) for space was approved with abstention from Israel and the United States. The stalemate continued in 2006 when on May 22nd, China and Russia presented the working document CD/1778 that first suggested different types of measures such as: exchange of information, demonstrations, notifications, consultations and workshops[35]. The document was followed by the 'adoption of the UN General Assembly Resolutions 61/58(PAROS)[36] and 61/75.
In 2008, the UN General Assembly (UNGA) issued a report concerning the TCBMs in Outer Space activities, in which Austria, Bangladesh, Kenya and, on behalf of the EU, Portugal, proposed the development of a code of conduct on space objects and activities related to outer space, recommending the establishment of general principles, which was attached to the report of the Secretary-General on *TCBMs in Outer Space Activities*[37]. Moreover, the EU supported the presentation of this Code of Conduct at the CD obtaining the approval of Resolution 62/20[38] on the prevention of arms race in outer space and of the Resolution 62/43 on TCBMs. On 12thFebruary 2008,China and Russia presented a draft treaty to the CD on the prevention of placement of weapons in outer space, the threat or use of force against space objects (*Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects - PPWT*)[39]. On 10th July 2008, the European Parliament approved a document on Space and Security[40] and on December 8th, the EU established a Draft Code of Conduct for Space Activities, introduced in the CD of 12th February 2009. Again,during the 2009 CD, Canada presented the document "*On the Merits of Certain draft Transparency and Confidence-Building Measures and Treaty Proposals for Space Security*[41]" and on October 28th, the draft resolution A/C.1/64/L.25[42], entitled *Prevention of an arms race in outer space,* was adopted with 176 votes in favour, none against and abstention from the United States and Israel.
In 2010, from 18th January to 26th March, a number of delegations supported the PAROS treaty as part of the CD. On 28thJunethe United States published a document on the new policy on outer space, which put the emphasis on the use of space for peaceful purposes, including activities for national security[43]. In addition, on 26thNovember, the EU Council on Competitiveness ordered the preparation of a comprehensive space strategy for the EU in order to carry out the Galileo and GMES projects[44].
On 4thFebruary 2011,the United States published the National Security Space Strategy, which highlighted the need for responsible use of outer space and greater international cooperation, in addition to the strengthening of international standards

through the use of a multilevel approach to deterrence. Then on 8thFebruary, the CD discussed the prevention of an arms race in outer space through the presentation of the Draft Code of Conduct for Outer Space of the European Union. From 28th March to 8th April, the Legal Subcommittee of United Nations Office for Outer Space Affairs, COPUOS, in its 50th session, expressed concerns about the gaps in the legal regime of outer space. In fact, from 1stto 11th June, the COPUOS, at the 54th session, focused on the use of satellite data for disaster management, space debris and climate change.
From 19th to 30th March2012, during the 51st session of the Legal Subcommittee of COPUOS, it became evident that the OST has not been able to adequately prohibit placing weapons in space, creating a need for closer communication between the Sub-Committee on Legal Affairs and the CD.

However, regarding the various initiatives mentioned above, some comments are necessary. First of all, PPWT is unable to properly define the notion of 'weapon', in particular in the context of outer space where most, if not all hardware, software and activities are of a dual-use character. Even in the terrestrial or airspace domain it is difficult to establish a clear definition of 'weapon'; an example is represented by a kitchen knife that, since 9/11,is now considered a potential weapon. Even the definition of 'weapons of mass destruction' (Article IV of OST) has never been clearly defined; again, after 9/11, an aircraft could have been considered a weapon of mass destruction. "It is for this reason finally that the Code of Conduct—by contrast to the draft PPWT—has a fair chance of success as it essentially builds upon the successes of, and experience with general international law in the realm of international and national security. Satellites, from the above perspective, are mankind's knives in outer space: capable of both causing horrible death and destruction and providing essential services for humanity[45]".

The Transparency and Confidence-building Measures.

On measures capable of improving space security, it is worthmentioningthe outcome of the ESPI Report n.28 "The Role of Transparency and Confidence-Building Measures in Advancing Space Security", drafted by Jana Robinson, Vienna 2010.
The report is based on the main objective of space security. The institutionalisation of space security in Europe will need to be compatible with the EU's overall external relations in accordance with the Lisbon Treaty. The Lisbon Treaty entrusts the European Commission with the elaboration and the implementation of a European Space Policy, which includes space security measures. It is clear that outer space activities are no longer a matter of solely U.S.-Russian bilateral relations and the EU must play a key role in space activities. The EU Draft Code of Conduct is one of the central proposals for a voluntary international agreement to enhance space security. TCBMs play a key role in improving space security. The study stresses the importance of TCBMs as traditional tools of diplomacy and international relations and recalls the lesson learnt from terrestrial TCBMs employed in the areas of arms control. The suggested measures for improving TCBMs are, inter alia:

- Raise overall awareness of space security concerns;
- Generate greater political will to cooperate;
- Build space TCBMs with like-minded partners. Europe and the U.S. should continue to take the lead in promoting safe and sustainable space-related activities;
- Strengthen Debris Mitigation Regime. The Inter-Agency Space Debris Coordination Committee (IADC) guidelines were accepted by the COPUOS in June 2007 and endorsed by the UN General Assembly in February 2008 (UNGA Res.

62/217). The U.S., China, Russia, Japan, and Europe have debris mitigation guidelines in place;

- TCBM Measures to Mitigate Interference (including jamming and spoofing) with Space Activities. This objective could be advanced via the establishment of an International Interference Information Centre and similar structures for priority concerns;
- Improve Compliance with OST and other obligations. Individual space-faring nations could strengthen overseeing of non-governmental entities in space through stricter technical standards, licensing requirements and financial penalties in cases of non-compliance;
- Improved Space Situational Awareness (SSA). No standardised regime, or organisation, systematically analyses and communicates threats to the satellites orbiting the Earth. To move a spacecraft in order to avoid potential collision, the operator needs to obtain key information. It includes the awareness of the situation, accurate spacecraft/debris positions and their future trajectories, and an assessment of the collision probability to include an error margin around each object.

There is an interesting proposal to establish an organisation for space similar to the International Civil aviation Organisation (ICAO).

From the status quo to a future treaty: prospects for transition

In point 3 it has been recalled how the OST and the UN Charter prohibit the use of force in outer space with two exceptions: self-defence and UN mandate. It is worth remembering also Article IX of OST, which provides that States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid harmful interference in space activities of other States Parties. The International Communication Union (ITU) Constitution also prohibits (Article 45) interferences to radio services or communications of other Member States or of recognized operating agencies.
However, we should consider whether the existing provisions are really effective in preventing the risk of a space blockade or if there is a need to develop specific legislation on the subject. In order to manage the transition from the status quo to an appropriate instrument of law, some ideas are definitely provided by the International Humanitarian Law and some rules of maritime warfare where space-based infrastructure are engaged from the ground.
If the infrastructure dedicated to the protect national interest are the first potential target, the Space Blockade could also affect dual-use infrastructure aimed at business continuity for land, sea and air, including the outer space and cyber domains. The dual-use technology would then permit civil satellites be engaged in case of conflict, as they can be easily converted into military satellites, becoming legitimately subject to engagement according to the International Humanitarian Law. The most connected analogy to this hypothesis is the practice of using government buildings and civil offices for the coordination of military operations. Different treatment is given to commercial satellites. If the civil objects cannot be subject to engagement, the international humanitarian law allows that the commercial ones may effectively contribute to military operations. However, if the goal is a broadcaster of commercial communications and cultural contents, according to the *Convention for the Protection of Cultural Property in the Event of Armed Conflict* (Article 8.1 letter a) it cannot to be engagedprojects[46]. In addition, a business object can become a legitimate military target in situations of non-neutrality. International law supports the principle of non-discrimination to the area specified in Resolution Conf. UNGA 41/65 on *Princi-*

ples Relating to Remote Sensing of the Earth from Outer Space[47]. In fact, on the principle that *"a neutral Power is not called upon to forbid or restrict the use on behalf of the belligerents of telegraph or telephone cables or of wireless telegraphy apparatus belonging to it or to companies or private individuals*[48]", it can be assumed that the possibility does not represent a violation of the rule of neutrality, although it might be susceptible to engagement procedures by other satellites. Then there is the category of satellites operated by international consortia[49] managed through legal frameworks and through the presence of many States, making the category in question a real problem[50] for potential planners of Space Blockade[51]. Actually, we should distinguish the now-privatised commercial consortia like INTELSAT, INMARSAT and EUTELSAT, and the still IGO consortia like INTERSPUTNIK and ARABSAT. While the International Telecommunication Satellite Organisation (ITSO) only supervises INMARSAT and EUTELSAT,IGO supervises EUTELSAT, while the supervision of the International Mobile Satellite Organisation (IMSO) still exists for INMARSAT, which stipulates the use and management for only peaceful purposes in accordance with Article 3 letter a of the *Convention on The International Mobile Satellite Organization*[52]. However, INMARSAT structure may be subject to the effective use by planners of Space Blockades, including governments and NGOs, on the basis of the act "*Information on the activities of international Intergovernmental and Non-governmental Organizations Relating to space law*", A/AC.105/C.2/L.278/Add.1[53]. However, after the privatisation or restructuring of the world's preeminent intergovernmental satellite organisations, INTELSAT, INMARSAT and EUTELSAT, it is unlikely that belligerent States and neutral States may be part of the consortium and therefore implicated, directly or not, in acts of war, which may create problems in the process of designation of the objectives.

Space stations must also be considered. In this case, the object can be included in two categories according to the role played by the astronauts on board[54]. According to Article V OST *"astronauts" should be considered envoys of mankind"*. This requires interpretation. The same treaty that designates astronauts as *envoys* also presupposes that States will abide by their obligation to limit national activity to peaceful purposes. Therefore, when an astronaut becomes a combatant and no longer exercises diplomatic functions, it would be incongruous for one person to simultaneously constitute a role as combatant and as "*envoy of mankind*". The interpretation of Article V OST could be that astronauts can be considered as "*envoys of mankind*" only when engaged in peaceful activities, as the Outer Space Treaty assumes them to be. When such conditions do not exist, they can no longer be regarded as *"envoys"* by opposing belligerent States[54]. Given the presence of civilians besides the military, in accordance with the principle of proportionality, collateral damage may be so disproportionate even if the presence of civilian astronauts aboard the space station make it impossible to engage[56].

Conclusions

From this brief analysis it appears that space law is still "under construction". Besides UN treaties, there are national sets of rules, varying from one country to another, that influence the international customary law. The provisions regulating a possible space war, attack or hostile actions do not have a rational easy to implement framework, perhaps because until now no space wars have occurred, including space blockades. However, just the space blockade could be the easiest act of space war. It could bring about the embargo of regions and countries exacerbating tensions already existing or even in the early phase could lead to wars between States through non-traditional means, procuring the interruption of operations of critical space infrastruc-

ture set up to ensure the continuity of government action and business activities, i.e. civil protection and security, food supply, health service, transport, energy, financial transactions.

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[1] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (5 August 1963); Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other celestial bodies (1967); Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968); Agreement Relating to the International Telecommunications Satellite Organization "INTELSAT" (20 Aug 1971); Convention on International Liability for Damage Caused by Space Objects (1972); Convention on Registration of Objects Launched into Outer Space (1975); Convention on International Maritime Satellite Organization (INMARSAT) with Annex (3 Sep 1976, amended in 1985, with Protocol 1981); Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979).

[2]Council Directive 93/83/EEC of 27 September 1993 on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission.

[3] Cf., A. Froehlich, Committee on the Peaceful Uses of Outer Space and its Main Results in 2014, The Aviation & Space Journal, Jul.y/Sept 2014, n. 3, p. 16.

[4]According to the 1909 London Declaration, which never entered into force, a naval blockade could not be extended beyond ports and coastal borders of the country against which there was a state of war.

[5]See, International Institute of Humanitarian Law, Rules of Engagement Handbook, Model Announcement – Warning Area and Exclusion Zone in the Territorial Sea, Appendix 5 to Annex C, San Remo, p. 78.

[6]See, Protocol additional to the Geneva Convention of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I), with annexes. Final Act of the Diplomatic Conference on the reaffirmation and development of international humanitarian law applicable in armed conflicts dated 10 June 1977 and resolutions adopted at the fourth session,. Geneva 8 June 1977.

[7]Article III – *"States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding*".

[8]1963 (XVIII). Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space

[9]Article IV – *"States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited".*

[10]Report of the Commission to Assess United States National Security Space Management and Organization, Washington D.C., January 11, 2001, pp. 8-13-14-15.

[11]Y. Dinstein, War Aggression, and Self-Defence, Cambridge University Press, 3rd edition, 2005, pp. 23-24-26, The fear grew up after studies which showed that the U.S. itself were just interested in gaining this advantage to the projected to less powerful rivals activities during conflicts.

[12]See Legality of the Threat or Use of Nuclear Weapons, Summaries of Judgments, Advisory Opinions and Orders of the International Court of Justice (not an official document), Advisory Opinion, 1996, July 8, I.C.J. 226, pp. 94-104; R. A. "Pete" Pedrozo, D. P. Wollschlaeger (Eds.), International Law and the Changing Character of War, International Law Studies, International Law Studies Series, Naval War College Newport, Rhode Island, Vol. 87, 2011.

[13]*See*, D. Fleck, M. Bothe (ed.), The Handbook of International Humanitarian Law, Oxford University Press, 1999, p. 51.

[14]See, S. Freeland, Outer Space, Technology and Warfare, The Aviation and Space Journal, University of Bologna, Jan./Mar., 2014, n. 1, p.38.

[15]See N. L. Remuss, The Need to Counter Space terrorism – A European Perspective, ESPI Perspectives 17, January 2009, p. 3.

[16]The San Remo Manual on International Law Applicable to Armed Conflicts at Sea was adopted in June 1994 by the International Institute of Humanitarian Law after a series of round table discussions held between 1988 and 1994 by diplomats and naval and legal experts. It is "the only comprehensive international instrument that has been drafted on the law of naval warfare since 1913." See also International Institute of Humanitarian Law, Rules of Engagement Handbook, San Remo, November 2009, Group 30-39, Series 30, Rule 30A, p. 37.

[17]See, ITU, Rules of Procedure, approved by Radio Regulations Board, Part. A, 2012.

[18]K-U. Schrogl, The concept of space traffic management as a basis for achieving the fair and equitable use of outer space, in, The Fair and Responsible Use of Space, W. Rathgeber, K.-U. Schrogl, R. A. Williamson (eds.), Springer-ESPI, Springer Verlag/Wien, 2010, pp. 132-42.

[19]See, Convention on Registration of Objects Launched into Outer Space, Article 2, par.2, according to par. 1, January 14, 1975.

[20]Ibid., Article IV, par 1, the UN Registry does not reveal the function of the object recorded.

[21]D. Wright, L. Grego, L. Gronlund, The Physics of Space Security, American Academy of Arts and Sciences, Cambridge, 2005, pp. 39, 158-160.

[22]See Frans Von Der Dunk: Beyond What? Beyond Earth Orbit?: The Applicability of the Registration Convention to Private Commercial Manned Sub-Orbital Spaceflight - California Western International Law Journal (2013).

[23]W. Marshall, "Reducing the Vulnerability of Space assets: a Multitier Microsatellite Constellation Architecture", Astropolitics, Vol. 6, 160-62; A. Steinberg, "Weapons in Space: The Needs to Protect Space Assets", Astropolitics, Vol. 10, pp. 248-67.

[24]N. L. Remuss, op. cit., p. 6.

[25]Ibid.

[26]N. L. Remuss, op. cit., p. 8.

[27]ICJ, Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, July 8th, 1996, I.C.J. 226, par. 87 (July 8).

[28]ICRC, Practice Relating to Rule 8. Definition of Military Objectives, URL: http://www.icrc.org/customary-ihl/eng/docs/v2_rul_rule8.

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[30]UNGA, Comprehensive Nuclear-Test-Ban Treaty, A/RES/50/245, 24 September 1996.

[31]McCormick &Michanick: The Transformation of Intergovernmental Satellite Organisations: Policy and Legal Perspectives (MartinusNijhoff Publishers 2013).

[32]UNGA, First Special Session of the General Assembly devoted to Disarmament (1978), A/S-10/2 Final document of SSOD-I: Resolution and Decisions of the Tenth Special Session of the GA; Second special session of the General Assembly devoted to Disarmament (1982), A/S-12/32 Concluding document; Third special session of the General Assembly devoted to disarmament (1988) A/S-15/50 Concluding document; Convening of the fourth special session of the General Assembly devoted to disarmament A/62/L.49.

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[34]UNGA, Fifty-ninth session Agenda item 64, Resolution adopted by the General Assembly, [on the report of the First Committee (A/59/458)], 59/65, Prevention of an arms race in outer space, A/RES/59/65, 17 December 2004.

[35]Conference on Disarmament, the People's Republic of China and the Russian Federation, working paper, Transparency and Confidence-Building Measures in outer space activities and the prevention of placement of weapons in outer space, CD/1778, 22 May 2006, p. 5.

[36]UNGA, Sixty-first session, Agenda item 89, Resolution adopted by the General Assembly, [on the report of the First Committee (A/61/393)], 61/58. Prevention of an arms race in outer space, A/RES/61/58, 3 January 2007.

[37]UNGA, Sixty-second session, General and complete disarmament, Transparency and confidence-building measures in outer space activities, Report of the Secretary-General, A/62/114/Add.1, 17 September 2007.

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[39]Conference on Disarmament, CD/1839. The United States rejected the proposal stating that in reality it was only a diplomatic expedient to obtain military advantages by the two countries.

[40]European Parliament resolution of 10 July 2008 on Space and security, A6-0250/2008, Strasbourg.

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[42]UNGA, Sixty-fourth session First Committee, Agenda item 94, Prevention of an arms race in outer space, C.1/64/L.25, 16 October 2009, pp. 3.
[43]See National Space Policy of the United States of America, June 28, 2010.
[44]Council of the European Union, Competitiveness Council of 25 November 2010, Brussels, p. 5.
[45]See Frans Von Der Dunk – Cutting the bread, University of Nebraska - Lincoln, 2013.
[46]See, Convention for the Protection of Cultural Property in the Event of Armed Conflict, art. 8.1, a, May 14, 1954.
[47]See, Principles Relating to Remote Sensing of the Earth from Outer Space, art. XII, G.A. Res. 41/65, U.N. GAOR, 41st Sess., 95th plen. mtg., U.N. Doc. A/Res/41/65 (Dec. 3, 1986).
[48]See, Convention Respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land (Hague V), Article 8, Oct. 18, 1907.
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[51]The Desert Storm case study confirms the fact that this operation was the first space war, also, the same goods, produced and transmitted by satellites, space assets are considerable, see,D. ISSLER, *Space Warfare Meets Information Warfare*, Joint Forces Quarterly, Autumn 2000, pp. 100-104. See also the capacity of InmarSat, EutelSat, Intersputnik, IntelSat Americas, SES S.A., ComSatecc.
[52]IMSO, Convention on The International Mobile Satellite Organization, Article 3(a), September 3, 1976, pp. 2-11; COPUOS, Information on the activities of international intergovernmental and non-governmental organizations relating to space law, A/AC.105/C.2/L.278/Add.1, pp. 2-8.
[53]See, Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I) (with annexes, Final Act of the Diplomatic Conference on the reaffirmation and development of international humanitarian law applicable in armed conflicts dated 10 June 1977 and resolutions adopted at the fourth session). Adopted at Geneva on 8 June 1977, cap. III, art. 52(2), p. 27.
[54]See, Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Articles 2-4, *pp. 9-10.*
[55]Robert A. Ramey, Armed Conflict on the Final Frontier: The Law of War in Space, The Air Force Law Review, Vol. 48, 2000, n. 1, pp. 150-153.
[56]Dinstein, *op. cit., p.* 120, 129.

MISCELLANEOUS MATERIAL OF INTEREST

ITALY: NEW NATIONAL RULES ON TRAFFIC RIGHTS FOR EXTRA-EU ROUTES

Anna Masutti *

In August 2014, the Italian Civil Aviation Authority (ENAC) issued a draft new version of Circular EAL 14A, whichlays down provisions to grant air traffic rights to air carriers to operate extra-UE scheduled flightsto and from Italy. According to ENAC itself, the revision of the previous version of the Circularbecame necessary in order to update the legal framework on the matter and to simplify ENAC's administrative activity, as well as to tackle the challenges of the air transport industry and favour new business opportunities.

The new Circular, which will become Circular EAL 14B once it comes into effect, was accompanied by a new draft model agreement for the attribution of extra-EU scheduled services, to be signed by ENAC and the air carrier. Both documents were subject to a stakeholder consultation process, which ended on 24 September 2014. It is therefore expected that the final version of Circular EAL 14B will be published soon.

As indicated above, the Circular applies to scheduled air transport services between Italy and non-EU States which are regulated by air transport agreements. In the new version, it is further specified that it may also be applied to chartered flights, whenever those are limited by the applicable air transport agreements.

In a nutshell, the new Circular indicates guidelines for the negotiation of air transport agreements with non-EU countries and defines the procedures for the appointment of air carriers and granting traffic rights. The main developments, some of which have already been applied in practice for some time now, concern:

- the enhanced participation of ENAC in the negotiation and conclusion process;
- eligibility criteria for the assignment of traffic rights;
- publicity and information on agreements and traffic rights.

Due regard is paid to the bilateral agreements in force between ENAC and the appointed air carriers, as well as to the international, European and national rules on the matter.

Firstly, ENAC's role in the negotiation and conclusion of air transport agreements with extra-UE countries is enhanced. It is indeed, provided that ENAC collaborates with the Department of Infrastructure and Transport in the negotiation and conclusion process. In this regard, ENAC will assess data related to the air transport market, e.g. air traffic statistics, the needs of the sector operators, developmental trends inthe sector, or use of assigned traffic rights. It will also take into account views of international institutions and EU bodies. On that basis, it shall represent the interests of the air transport industry in negotiations with foreign aviation authorities, side by side with the ministerial department.

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Secondly, the eligibility criteria that allow national or European airlines to operate extra-EU routes to and from Italy have been clarified. Air carriers seeking authorization must hold a valid air operator certificate and operating license in accordance with EU Regulation 1008/2008 and the national provisions laid down by ENAC in the implementation thereof. Authorization may be granted to national airlines and EU airlines established in Italy, pursuant to the so-called "*standard clause*" in air transport agreements. When air transport agreements are of a global nature, both national and EU carriers may be assigned traffic rights.

In order to be considered as established in Italy, the Circular points out that EU airlines need to have a stable organization in Italy, as well as a branch and at least one operational base. Moreover, they are required to register with the national Companies Register and to submit a security program, as well as to appoint a safety supervisor. Furthermore, these carriers need to comply with Italian law, especially regarding air transport, taxes and social security, in order to keep their traffic rights.

In addition to that, publicity given to air transport agreements is improved. In fact, ENAC will be informed about the conclusion of any new agreement and provide a list of the existing agreements on its website. Within 20 days from conclusion, ENAC must notify airlines that are entitled to the assignment of traffic rights, handling companies and the trade unions, which had previously so requested.

The main goals of the selection procedure for the granting of traffic rights are:

- to maximize benefits for consumers and increase commercial trade and tourism;
- to develop the general civil aviation system, especially the air transport industry and the airport network;
- to enhance fair competition.

While insufficient traffic rights – meaning that they are not sufficient to satisfy companies' interests - are granted through a public selection procedure, the rest of the routes are assigned following the order of arrival of the requests to ENAC's offices.

As is the case with all traffic rights granted by ENAC, the "*use it or lose it*" principle applies. In fact, according to the new Circular, if the appointed carriers do not activate the route, or do not properly comply with the transport terms, or interrupt the relevant flight operations, ENAC will withdraw their traffic rights. Moreover, in the event of lack of activation, suspension or interruption of scheduled flights, carriers will be required to re-protect the affected passengers.

MISCELLANEOUS MATERIAL OF INTEREST

EUROPEAN COMMISSION REPORT ON UAS: THIRD-PARTY LIABILITY AND INSURANCE REQUIREMENTS

Anna Masutti *

In November 2014, a "Study on Third-Party Liability and Insurance Requirements of Remotely Piloted Aircraft Systems (RPAS)", elaborated by the independent transport consultant Steer Davies Gleave, was published by the European Commission. The following article takes a closer look at the main points of this exhaustive report.

Purpose of the Study

The Study states that RPAS (also known as UAS, Unmanned Aerial Systems) have to become as safe as traditional aviation in order to allow the development of civilian operations. Accidents may of course happen, however, adequate compensation for victims needs to be provided. For these reasons, the report analyses the existing liability regimes and the legal conditions of third-party liability insurance in the European Union, as well as the current industry practices and the insurance market. Additionally, recommendations are made with the aim of protecting third parties, while supporting the development of the European RPAS industry.

Conclusions on Liability

The report under consideration concluded that **no harmonized regime for liability** for damages to third parties caused by RPAS (or even manned aviation) exists either at EU level or internationally. Therefore, the issue is regulated by national rules, which vary from State to State.

In addition to that, the Study found that the majority of EU Member States provide for **strict liability** on UAS, i.e. the defined party is automatically liable for damages, regardless of attribution of fault. In the case of RPAS, identifying the liable party may be more complex than in manned aviation.

According to the Study, the **liable party** is generally considered the **operator**, who is required to have insurance for third-party liability pursuant to EU Regulation 785/2004. As a result, without identification of the UAS operator it is not possible for third parties to obtain compensation. Since in some scenarios the operator could hardly be identified (owing to the complete destruction or loss of control of the aircraft, intentionally concealing one's identity, etc.), it is important to ensure that operators can be identified based on physical information of the unmanned aircraft.

In any case, nothing prevents either victims or the operator from making **claims against other parties**, such as the **manufacturer** of the RPAS. The European Product Liability Directive 1999/34/EC, which establishes the principle of liability without

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fault, applies to manufacturers and importers also in this sector.

The process of obtaining compensation for victims tends to be lengthy and complex, sometimes involving **judicial proceedings**. In a **recent case in the United States**, the National Transportation Safety Board (NTSB) ruled in favour of the Federal Aviation Administration (FAA), after the latter sought to assess a civil penalty for the operation of UAS in a reckless and careless manner. On 18 November 2014, after a series of appeals, the NTSB concluded that: (1) RPAS are "*aircraft*" within the Federal Aviation Administration's statutory and regulatory definitions; and (2) prohibited RPAS operation in a careless and reckless manner under FAA regulations. The decision represents a significant victory for the FAA in its attempts to prohibit unlawful UAS operations. Ultimately, the ruling highlights to both private and commercial operators that RPAS are clearly under the FAA's jurisdiction[1].

Conclusions on Insurance Requirements

Thanks to the above-mentioned **Regulation 785/2004**, the EU has a **well-established and functioning framework** defining third-party liability insurance requirements for RPAS, based on the mass of the aircraft. Other factors that may influence the importance of damages caused by an accident are not taken into account.

However, the scope of the Regulation raises some issues. In fact, it does not apply to model aircraft under 20 kg. In some cases, there may be no difference between a model aircraft and a light RPAS, so the latter would not be covered.

Given the **lack of data on damage caused by RPAS accidents**, it is not possible to reach definitive conclusions as to whether the current minimum requirements for third-party liability insurance for RPAS are sufficient. However, some indicators show that they are relatively low. While affordable insurance is available in most Member States, the small number of providers entails limited price competition.

Considerations on the Risks of Lack of Insurance

The Study also took into account the possibility that illegal, uninsured operations could take place. It found that the **risk of illegal operations is greater in the UAS sector** compared to manned aviation. Although it is not possible to estimate the current proportion of illegal RPAS operations, tackling this issue would **allow damaged parties receive compensation**. Moreover, if the UAS sector grows as is projected, there will probably be a need for **increased enforcement action by national authorities** concerning insurance and other regulatory requirements in the future.

Given the present lack of information on the proportion of uninsured operators, the report states that it is impossible to determine at this stage whether a compensation scheme would be feasible and how it could work.

Recommendations

The Study found no evidence that the above-mentioned variation in third-party liability regimes across Europe hindered the development of the RPAS market or created

significant problems in granting victims adequate compensation. As a result, it recommends that **no attempts to harmonize third-party liability regimes across the EU** be made.

Moreover, the report recommends that **criteria for minimum insurance requirements** remain unchanged, for there is neither sufficient data on the actual damage caused by RPAS in incidents nor clear reasons for treating RPAS differently from manned aircraft. However, it is recommended that minimum insurance requirements be reconsidered in light of data that will be collected in the future.

In other words, the Study recommends what has been put forward in other contexts, i.e. that the existing legal framework on manned aviation may also be applied to unmanned operations, making specific adjustments to adapt the legislation as they become necessary.

[1] NTSB Order No. EA-5730, November 18, 2014, Michael P. Huerta, Administrator, Federal Aviation Administration v. Raphael Pirker, accessible at: http://www.ntsb.gov/legal/pirker/5730.pdf

EBOLA OUTBREAK: ARE AIR CARRIERS LIABLE?

Anna Masutti *
Alessandra Laconi **

Ebola Virus Disease (or "Ebola", as commonly known) is a severe and often fatal viral illness in humans. The recent deadly outbreak started in Guinea in December 2013, and by March this year it had spread through West Africa in alarming proportions. On August 8th, the World Health Organization (WHO) declared the Ebola crisis an international public health emergency. There have been serious emergency response plans and action taken by the involved countries, in a desperate and concerted effort to contain the disease.

Regretfully, the scale of diffusion of the virus has overtaken the preventive and containment measures put into practice: in the deadliest Ebola outbreak so far, every day more people are becoming infected and more are dying because they cannot get the care they need[1], and fear of infection is having significant impacts on daily life in the affected regions.

The first symptoms of Ebola are similar to a common cold or flu, since they include the sudden onset of haemorrhagic fever, fatigue, malaise, muscle pain, headache and sore throat. These symptoms are followed by profuse vomiting, diarrhoea, rashes, liver and kidney impairment, internal and external bleeding[2].

The virus is spread from human-to-human via direct contact - *i.e.* through broken skin or mucous membranes, like eyelids - through blood, secretions, organs or other body fluids of infected people, and by means of contaminated materials and surfaces (bedding, clothing and the like[3]).

On average, the incubation period for Ebola is 2-21 days, but it is worth pointing out that an infected person cannot spread the virus until the onset of the above-mentioned symptoms.

From an aviation perspective, some action has been taken. The heads of the WHO, the International Civil Aviation Organization (ICAO), the World Tourism Organization (WTO), Airports Council International (ACI), International Air Transport Association (IATA) and the World Travel and Tourism Council (WTTC) decided to start a Travel and Transport Task Force, which will monitor the situation and provide timely information both to the concerned professionals and to travellers.

In light of the above, airlines may be concerned about their potential exposure to claims, thus it is necessary to evaluate the real extent of their hypothetical liability.

As known, the liability of the air carrier for death or injury caused to a passenger is covered by the Montreal Convention of 1999: in particular, article 17 states that "*The carrier is liable for damage sustained in case of death or bodily injury of a passenger*

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upon condition only that the accident which caused the death or injury took place on board the aircraft or in the course of any of the operations of embarking or disembarking".

With regard to those States that have not yet ratified the Montreal Convention but have ratified the Warsaw Convention of 1929, the Warsaw liability principles, which are similar to the ones described, will apply.

In particular, according to article 17 of the Warsaw Convention *"The carrier is liable for damage sustained in the event of death or wounding of a passenger or any other bodily injury suffered by a passenger, if the accident which caused the damage so sustained took place on board the aircraft or in the course of any of the operations of embarking and disembarking".*

One can notice subtle differences between the two provisions: the element of "bodily injury" as introduced by the Montreal Convention has effectively precluded the fruitful claim of mental injury, unless it was caused as a result of a bodily injury[4].

Therefore, it is conspicuous that air carrier liability is made up two elements: *(i)* death or injury has to be caused by an "accident", and *(ii)* the accident should take place on board the aircraft or in the course of any of the operations of embarking or disembarking.

Firstly, it must thus be assessed the extent of the definition of "accident", since it is not defined in the Montreal Convention (and it was not defined in the Warsaw Convention). According to the relevant case-law, an accident is an untoward event, a circumstance which unexpectedly takes place out of the usual course of things[5] and not the passenger's reaction to it however acute that might be[6].

In the known and influential cause Air France v. Saks[7], the US Supreme Court found that the deafness caused by the depressurization of the plane was not an "accident" within article 17, because it was the passenger's internal reaction to the usual depressurization of the plane[8].

Therefore, if the event on board an airplane is usual, ordinary or expected, such an event cannot be deemed as an accident. Liability is thus not engaged in respect of death or injury simply because it arises in the course of, or following, a carriage by air, if it can be included among the foreseeable incidences of air travel.

Moreover, it is interesting to underline that the available jurisprudence concerning Deep Vein Thrombosis (DVT, also called "Economy Class Syndrome", because of the increased risk of clots due to leg inactivity and cramped seat space potentially causing poor circulation for a prolonged period of time) is quite univocal, stating that a failure to warn passengers of precautions cannot constitute an accident according to article 17 of Montreal Convention[9]. This means that if the only thing external to the passenger which is alleged to be unusual or unexpected is something which does not happen, namely, an omission, there can be no accident. An omission can lead to an accident, but the omission itself cannot be the accident for the purposes of article 17.

However, before automatically excluding the death/injury as a non-accident, it must be examined whether the flight crew followed normal operating procedures.

The question of whether liability exists when air carriers aggravate or cause injuries to passengers through its actions or inactions has been examined by the judgment Husain v. Olympic Airways[10], which found that an air crew's failure to respond to a known risk to a passenger was an "accident" under article 17, because the crew could have minimized the involved risk without disturbing the normal operation of the aircraft. The Court determined that the flight crew's conduct went beyond a mere negligence standard, due to the potential notorious danger caused by second-hand smoke to asthmatic passengers.

Anyway, it must be noted that such an expansion of the interpretation of "accident" seems to be limited to a small class of potential plaintiffs, as it could solely be applied to cases where the aircraft personnel are aware of the pre-existing condition, and can reasonably do something to aid the involved passenger without interfering with the normal operations of the flight.

In the Ebola case, scientists have stated that the risks of catching an infection from an ill passenger during a flight are low: in fact, unlike infections such as influenza or tuberculosis, Ebola is not spread by breathing air from an infected person, since – as described above – it requires exposure that could be defined as unlikely for the average traveller[11].

It must also be considered that Ebola cannot be transmitted unless a person manifests the disease, so infection during the incubation period is precluded, and sick persons usually feel so unwell that they cannot travel. An airline would in all probability not be able to detect an infected person who boards its aircraft, while showing no signs of the disease during the incubation period.

But what about the legal perspectives arising in the hypothesis that a traveller (or his/her heirs) summons an airline asserting its liability for the infection of the virus?

Regarding the aforementioned "accident" requirement, the plaintiff would need to prove that contracting Ebola was unexpected/unusual at the time of the flight: given the extensive global coverage of the issue, it could be argued that passengers would be aware that transmission might, however statistically unlikely, nevertheless occur.

In order to mitigate the risk, however, prudent airlines should take the necessary steps to isolate a passenger on-board where the symptoms described herein arise, also in the light of the examined Husain v. Olympic Airways case, where the airline was held liable on the basis that it did not adopt the adequate measures to move the ill passenger notwithstanding the serious and known risk. Anyone showing the symptoms would reasonably be quarantined on arrival, and health authorities would also check who had been in contact with them, in order to avoid spreading the virus.

A passenger claiming compensation for contracting Ebola would also need to prove that the transmission occurred whilst on the aircraft or at boarding or disembarkation. One has to determine what the "course of operations of embarkation and disembarkation" are. Courts have not adopted the simplistic notion that only the acts of getting into and out of the aircraft should be considered for the purpose, since the liability has to be assessed according to the location of the passenger when the event occurred, the activity he/she was involved in at the time and the control measures adopted by the airline.

In practice, it seems that the burden of proof lying on the claimant could be hardly satisfied in the case of Ebola, since it must be demonstrated that the infection – notwithstanding the mentioned asymptomatic incubation period – occurred on the aircraft or while embarking or disembarking, rather than in the duty free or other areas of the airport, or even outside the airport infrastructure.

In any case, a passenger cannot claim compensation from an air carrier for mental distress caused by the apprehension that he/she seated near a person showing signs of sickness that were perceived as symptomatic of Ebola.

Furthermore, the liability of the airline in case of transmission of Ebola must be evaluated according to the relevant recommendations issued by the relevant authorities, organizations and associations.

Currently, the thermal screening of passengers at airports is not recommended, since the scanners used to detect a fever are unlikely to find people incubating the first stages of the disease, but the recommendations may change depending on the evolution of the situation[12].

According to the operational procedures recommended by IATA, in case of a passenger presenting with symptoms compatible with Ebola on board an aircraft, cabin crew should immediately apply precautionary and protective measures according to the protocol, such as distancing other passengers if possible and reseating them away from the symptomatic passenger, limiting contact of the passenger to the minimum necessary, performing hand hygiene, and immediate notification of authorities at the destination airport in accordance with procedures endorsed by the ICAO[13].

The recommendations addressed to States seem to exclude specular obligations on air carriers: States with Ebola transmission are called to operate exit controls (consisting of, at a minimum, a questionnaire, a temperature measurement and, if there is fever, an assessment of the risk that the fever is caused by Ebola) of all persons at international airports for unexplained febrile illness consistent with potential Ebola, and to deny travel to persons with an illness consistent with Ebola if travel is not a part of an appropriate medical evaluation.

In relation to all other States, there should be no general ban on international travel or trade, but States should provide relevant information on risks, measures to minimize those risks to travellers to Ebola-affected and at-risk areas and give advice for managing potential exposure.

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In light of the above, it seems difficult – in the current situation – to affirm that the (unlikely) transmission of Ebola from one passenger to another could cause the liability of the carrier, since *(i)* crew members could not be aware of the pre-existing health condition of a traveller during the asymptomatic period of incubation of the virus, *(ii)* now, the transmission of the disease could not be qualified as "accident" according to article 17 of the Montreal Convention, *(iii)* the burden of proof lying on the claimant could hardly be satisfied in the case of Ebola, because it must be demonstrated that the infection occurred on the aircraft or while embarking or disembarking, *(iv)* airlines cannot be liable for failures attributable to public authorities.

Moreover, in respect of liability, airlines may then likely refer to their general conditions of carriage, which usually contain a right to refuse carriage where it is necessary

to comply with government regulations or if carriage endangers the safety and health of other passengers and the crew.

In any case, these conclusions are not immutable, being necessarily anchored by scientific, medical and technological knowledge and by air transport industry standards.

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[1] The disease has killed more than 3,400 people in western Africa and, since March of 2014, more than 7,400 people have contracted Ebola in those countries considered to be in the so-called "Ebola Zone" (Guinea, Sierra Leone, Liberia and Nigeria). (See http://edition.cnn.com/2014/10/08/health/ebola-us/index.html). Already Ebola cases have been reported in the United States, Spain, Germany and Mali.

[2] See ROY C. BARON, JOSEPH B. MCCORMICK, OSMAN A. ZUBEIR, *Ebola virus disease in southern Sudan: hospital dissemination and intrafamilial spread*, Bulletin of the World Health Organization, 61 (6): 997-1003 (1983).

[3] The World Health Organization (WHO) has highlighted that *"the safest thing that anyone can do is to avoid direct contact with bodily fluids of people who have Ebola, and with surfaces and materials (e.g. bedding, clothing) contaminated with fluids"* (see www.un.org/ebolaresponse/pdf/UNMEER-virus-press-release.pdf).

[4] MASUTTI, *Il diritto aeronautico. Lezioni, casi e materiali*, 2009, 258-261.

[5] Circumstances which have been qualified as "accidents" are, for example: a fail inside the aircraft or from the aircraft due to a stairway or faulty steps, injury caused by a food trolley, assault by airline staff, a flight attendant spilling hot water/coffee on a passenger. About the notion of "accident" see MORSELLO, *Responsabilidade civil no Transporte Aéreo*, São Paulo, 2006, 58; GOLDHIRSCH, *Definition of Accident: Revisiting Air France v. Saks*, Air and Space Law, 2001, 86; LA TORRE, *Trasporto aereo di persone e responsabilità del vettore, Il trasporto aereo tra normativa comunitaria ed uniforme*, Milano, 2011, 70; MASTRANDREA, *L'obbligo di protezione nel trasporto aereo di persone*, Padova, 1994, 181.

[6] See House of Lords, [2005] UKHL 72, [2006] 1 AC 495, 19, 20 October; 8 December 2005, 8 December 2005.

[7] *Air France v. Saks*, 470 US 392 (1985).

[8] See DI GIACOMO, *The End of an Evolution: From Air France v. Saks to Olympic Airways v. Husain - The Term "Accident" under Article 17 of the Warsaw Convention Has Come Full Circle*, Pace Int'l L. Rev., 2004, Vol. 16, 409.

[9] *Idem*; Court of Appeal (Civil Division), [2003] EWCA Civ 1005, [2004] QB 234, 1, 2, 3 July 2003, 3 July 2003. In Italy, compensation has been denied by: Trib. Varese, 3 February 2009, No. 309, notes of: POLLASTRELLI, *Il risarcimento del danno da sindrome da classe economica*, Riv. dir. nav., 2010, 392; CARGNIEL, *Trombosi nel trasporto aereo: nesso di causalità e nozione di incidente, Diritto dei Trasporti, 2010, 459. See also Trib. Roma, 28 April 2008, Diritto dei Trasporti, 2010, 473.*

[10] *Husain v. Olympic Airways, 316 F.3d 829 (9th Cir. 2002), cert. granted, 123, S. Ct. 2215 (2003).*

[11] *See http://www.bbc.com/future/story/20140731-can-ebola-spread-on-planes. Some interviewed virologists affirmed that "It is not anymore dangerous than any place where you are in touch with lots of people. [...] The aeroplane ventilation goes from the ground to the ceiling, where the air is filtered for bacteria and viruses before it recirculates. [...]. The biggest risk is not on the plane, but in the taxi on the way to the airport".*

[12] *The United States Center has announced the implementation of a new passenger screening process at five airports (New York's JFK International Airport, Dallas International Airport outside Washington D.C., Newark Liberty International Airport in New Jersey, O'Hare International Airport in Chicago and Hartsfield-Jackson Atlanta International Airport), where an estimated 94% of all travellers from West Africa enter the United States (see Newly vigilant US will screen fliers for Ebola, NY Times, 9 October 2014).*

[13] *WHO, Travel and transport risk assessment: interim guidance for public health authorities and the transport sector, September 2014.*

MISCELLANEOUS MATERIAL OF INTEREST

FROM BUDGET TO BUSINESS, FROM SHORT-HAUL TO LONG-HAUL: HOW LOW-COST AIRLINES ARE DEVELOPING NEW MARKET STRATEGIES

Alessandra Laconi *

The global economic crisis which also affected the aviation sector lead carriers to think about new business plans in order to attract always more customers, renovating their commercial consideration and diversifying the available flying choice.

As known, the Dubai-based airline Emirates obtained slots and traffic rights to extend one of its three daily flights from Dubai to Milan-Malpensa onwards to New York (JFK), starting the service from October 1, 2013, and being the only carrier in the region to offer a first class cabin.

The Abu Dhabi-based Etihad Airways is all set to ferry passengers bound for the U.S. through Dublin, under a deal with Irish flag carrier Aer Lingus. Emirates, Etihad and Qatar Airways have recently added flights to the Americas, before having significantly expanding into Asia and Europe.

Focusing on European carriers, the new market strategies adopted by low cost companies Ryanair and Norwegian stand out due to the significant evolution *(i)* from budget to business target and *(ii)* from short-haul to long-haul flights, respectively.

These two interesting plans of actions will be examined hereinafter.

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Ryanair's chief executive officer Michael O'Leary recently announced that 22% of the low-cost carrier's passengers are corporate travellers. As known, Ryanair is the biggest EU airline, carrying 81,4 million people last year, thus it may not be surprising that some routes are likely to attract a high volume of corporate traffic.

On the other side, Ryanair brands itself as Europe's unique ultra-low-cost airline. Its business model underplays non-essential extras and perks, maximizing ancillary revenue and flying to the advertised cheaper secondary airports.

One might argue that none of these features seem suitable for business travellers. Nevertheless, 17,9 million suits fly with Ryanair every year. The reasons can be the following ones:

- companies are unwilling to invest on business-class seats in the current economic climate;
- the retrenchment of full-service carriers on short-haul routes: indeed, the advent of low cost carriers in the 90s forced Europe's older airlines to rethink their business models. As a consequence, on short-haul most travellers look for a cheaper airfare.

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Such a scenario could be considered as favourable for Ryanair, but the Irish airline was aware that other European low cost carriers – like EasyJet and Germanwings – were already experimenting with new ways of attracting business passengers.

Therefore, Ryanair is now trying to overhaul its image in order to woo corporate travellers who are willing to pay more for their flights. Such a market strategy has recently been put in practice by the launch of "business plus" tickets, which will allow passengers to make changes to their flights up to 40 minutes before their original flight was due to depart for no extra fee.

Business travellers will also be offered a 20kg baggage allowance plus "premium" seats at the front of the aircraft cabin or in aisles where there is extra leg room. Where it is available, business travellers will also be able to pass through the fast track security lanes at airports and they will have similar priority during boarding.

Ryanair exposes that that 25 million out of the 86 million passengers it will fly this year will be business passengers and it is seeking to win further market share on strategic routes.

Other low cost carriers acknowledged that long-haul flights are not cheap, and that this scenario could offer a potential occasion to develop new business strategies.

Norwegian Air Shuttle, which specializes in low cost flights within Europe[1], announced its new cost-efficient flights last October, and it has recently expanded its model to the US and Asia. In particular, from the beginning of July 2014, Norwegian flies from London Gatwick to New York, Los Angeles and Fort Lauderdale in Florida. The Scandinavian airline also started flying between Oslo and New York in May, planning to add more routes.

Other airlines have tried a low-fare approach on long-haul flights, with little success. But Bjorn Kjos, Norwegian's chief executive, is confident that the carrier will offer 50% cheaper fares compared to competitors[2].

The new operation from Norwegian has attracted controversy, particularly in the United States, for taking advantage of differing international legislation to circumvent labour costs and buy aircraft on more favourable terms than competitors.

In fact, Norwegian established its long-haul company in Dublin for its air traffic rights as an EU nation and to maintain export guarantees to finance its fleet orders complying with European safety standards[3].

Maybe the fear is that if Norwegian is successful, then that will invite Ryanair and some US low cost carriers to offer a budget target service on trans-Atlantic routes.

It remains to be seen how these market strategies will develop in the short and long term, and if the offering of a diversified range of flight options could represent a profitable and sustainable business opportunity for carriers, and a better service accompanied by a fares decrease for travellers.

MISCELLANEOUS MATERIAL OF INTEREST

[1] Norwegian Air Shuttle is the third largest low cost airline in Europe after Ryanair and EasyJet, and it carried more than 20 million passengers last year.
[2]In a joint letter to the Department of Transportation, Delta Air Lines, United Airlines and American Airlines said the low-cost airline wanted to skirt labour laws, giving it a competitive advantage on trans-Atlantic routes in direct competitions with US carriers.
[3]In February 2014, Norwegian Air Shuttle's Irish subsidiary, Norwegian Air International, received an operating licence and an AOC issued in Ireland so it can access future traffic rights to and from the EU. Moreover, the airline based some of its pilots and crew in Bangkok, hiring flight attendants in the US, and flying the most advances jetliner in service, the Boeing 787 Dreamliner.

MISCELLANEOUS MATERIAL OF INTEREST

UNMANNED AIRCRAFT SYSTEM (UAS) OPERATIONS IN THE UNITED STATES: NATIONAL TRANSPORTATION SAFETY BOARD (NTSB) DECISION IN FAVOUR OF FEDERAL AVIATION ADMINISTRATION (FAA)

Alfredo Roma *

In June 2013, the FAA sought to apply a civil penalty of $10,000 to Raphael Pirkerfor operating a UAS in a reckless and careless manner. In particular, FAA alleged that Pirkerhad piloted an unmanned aircraft — a Ritewing Zephyr — in a series of manoeuvres around the University of Virginia campus in Charlottesville, Virginia, on October 17, 2011. On appeal of the FAA's $10,000 civil penalty order, the NTSB Administrative Law Judge (ALJ)revoked the FAA's order, arguing that the FAA could not take action for the UAS operations because UAS, being "model aircraft" under FAA policy, are not "aircraft" under statutory and regulatory definitions. They are therefore removed from the FAA's jurisdiction and applicability of the FAA's operating regulations.

The FAA appealed the ALJ's decision to the NTSB, and on November 18, 2014, in a unanimous decision, the National Transportation Safety Board concluded that unmanned aircraft systems (UAS) are: (1) "aircraft" within the Federal Aviation Administration's statutory and regulatory definitions; and (2) prohibited from operating in a careless and reckless manner under FAA regulations.

The decision represents a significant victory for the FAA in its attempts to prohibit unlawful UAS operations. Therefore, the opinion reverses an NTSB Administrative Law Judge's decision that the commercially operated UAS was a "model aircraft" beyond the FAA's authority.

In addition, the full Board decision affirms the FAA's ability to regulate both manned and unmanned aircraft operations and seek civil penalties from UAS operators in violation of FAA regulations. Ultimately, the decision puts both private-use and commercial operators on alert that UAS are clearly under the FAA's jurisdiction.

The NTSB left many issues unanswered, including the legality of the FAA's decision to prohibit commercial UAS operations without an exemption, privacy concerns, and various constitutional issues, limiting the scope of its opinion in deciding whether UAS are "aircraft" and whether UAS operations are subject to the FAA's regulation on careless and reckless operations.

Firstly, in a cogent and concise discussion, the full Board found that the statutory (49 U.S.C. § 40102(a)(6)) and regulatory definitions (14 C.F.R. § 1.1) of "aircraft" are broad and clear to include UAS. Even accepting the ALJ's characterization of UAS as "model aircraft," the NTSB found UAS largely within the broad definitions of "aircraft."

The NTSB found no distinction between manned or unmanned aircraft in the statutory or regulatory definitions, or FAA's policy for "model aircraft."

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Secondly, the NTSB held that the FAA's interpretation that §91.13(a), which prohibits the careless and reckless operation of an aircraft, applied to unmanned aircraft was reasonable, given the broad language of the regulation.
The NTSB's decision firmly establishes that both recreational and commercial UAS operators must comply with §91.13(a)'s safety mandate. The NTSB's decision will not come as a surprise to those who have followed UAS developments closely, as the FAA maintains a tight grip on UAS expansion into the National Air Space (NAS) as it develops rules to safely integrate them into the NAS.