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GNSS liability issues: Possible solutions to a global system

by

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Abstract

Navigation by satellite –GNSS- is a local technology with global repercussions. Although operation and control rest in government hands, the consequences of satellite use, most often beneficial, have a worldwide effect. Controversy arises when this free-of-direct-charge technology, on which the International Community relies, fails, thus causing damage to third parties.

It was the intention of the drafters and negotiators of the international space law regime to establish a victim-oriented liability framework, in order to guarantee adequate compensation for damage caused by space activities. Unfortunately, it seems that the present regime has only partially met these goals.

The surest means of obtaining compensation is through domestic legal regimes, but these regimes are naturally subject to the ebb and flow of government policy and judicial discretion.

The present thesis will analyse the established liability regimes for which a damaged GNSS final user may seek compensation, and will finally consider whether the drafting of a GNSS Convention is opportune.

Résumé *

La navigation par satellite est une technologie locale ayant des répercussions mondiales. Tandis que son opération et son contrôle relèvent généralement de gouvernements nationaux, les effets -le plus souvent bénéfiques- du système global de navigation par satellites (GNSS) peuvent naturellement s'avérer transfrontaliers. Ainsi, se pose le problème de dommages causés à des tiers résultant d'une défaillance de ce système, auquel se fie la communauté internationale.

Conscients de ce risque, les auteurs du dispositif juridique régissant les activités spatiales internationales ont voulu créer un régime de responsabilité juridique permettant une réparation adéquate des dommages causés aux tiers par ces dernières. Ce régime reste cependant incomplet, aujourd'hui.

Le moyen de réparation le plus efficace étant le recours aux instances judiciaires nationales, chaque régime national reste cependant soumis aux fluctuations des politiques gouvernementales et des orientations jurisprudentielles des tribunaux compétents.

La présente thèse a pour but d'analyser l'actuel régime de responsabilité gouvernant les activités de navigation par satellite et d'étudier l'opportunité de la rédaction d'une Convention GNSS.

* I would like to thank Mr. Sébastien Pechberty for kindly having translated this *Abstract* into French.

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Finally, I would also like to use this opportunity to thank those who kindly helped me with this thesis by providing me with very useful logistical support;* some of them appear as a footnote and some of them not.

* I express my gratitude to Mr. Edward Lippert for kindly having checked English grammar in this work.

TABLE OF CONTENTS

Introduction

Navigation by means of Global Navigation Satellite Systems[1] is already a major space application and its relevance will increase in the near future to equal that of other major space activities, such as telecommunication services.

In Europe alone 6 millions users currently rely on the United States' Global Positioning System. In comparison it is estimated that by year 2020 GNSS will have some 800 millions users around the world and a global revenue of 155 billion Euros.[2]

Navigation by satellite has been called in the U.S. as the 5th utility (alongside water, electricity, gas and telephone)[3] and the European Union Commission has identified it as "a critical technology that will revolutionize European transport infrastructure"[4] with all the socio-economic consequences that such a *revolution* will bring.

The present work will examine the liability regimes established for damage resulting from a GNSS malfunction. For this purpose, international and domestic legal regimes will be analysed in order to evaluate the liability framework governing GNSS signals providers.

This thesis is divided into three chapters. The first chapter will briefly describe the functioning and the applications of GNSS, and will also give a concise overview of existing and planned global satellite systems.

The second chapter deals with the liability regime established in the international arena, for the understanding of which a short introduction explaining the functioning of general public international law seems to be a must. The different sources of international law and its repercussions on the GNSS liability regime will also be considered.

In the third a final chapter, a comparative view of some domestic legislation, from both public and private law perspectives, will be offered.

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[1] Global Navigation Satellite Systems [Hereinafter GNSS]

[2] Technical documents of the EU Commission, Directorate-Generale of Energy and Transport: "The European Dependence on US-GPS and the Galileo Initiative" (2001) Information online available at <http://www.europa.eu.int/comm/energy_transport/library/gal_european_dependence_on_gps_rev22.pdf> (Date accessed 12/07/2002).

[3] See "The European Dependence on US-GPS and the Galileo Initiative", p. 1. *Ibid.*

[4] Commission of the European Communities White Paper – "European Transport Policy for 2010: time to decide." COM (2001) 370, Brussels 12/09/2001, p. 101. Online information available at the EU website <http://europa.eu.int/comm/energy_transport/library/lb_texte_complet_en.pdf> (Date accessed 27/06/2002).

Chapter I. *General Characteristics and Benefits of GNSS. Current and Planned Global Satellite Systems.*

1. *General Characteristics and Benefits of GNSS*

Global Navigation Satellite Systems (GNSS) are those space-based means of providing navigation and timing services to all kinds of users on the surface of Earth, on the air space and even in outer space.[5] It may also be defined as a worldwide positioning and time determination system, that includes one or more satellite constellations and receivers as well as a integrity monitoring system, all augmented as necessary to support the required navigation performance for the actual phase of operation.[6]

The technology used in the different navigation satellite systems, the existing U.S.'s GPS and the Russian Federation's GLONASS as well as the planned EU's Galileo, is very similar.

GNSS satellites are equipped with atomic clocks that enable them to send out radio signals to a ground-base terminal, either fixed or mobile, and thus determine with great accuracy the position (longitude, latitude and altitude), the velocity and the time of the receiver.[7] The radio signals are received from at least three different satellites at once; hence they calculate the position and velocity of the terminal from the convergence point of the three radio signals. These satellites are controlled from ground-based earth stations located in different parts of the world, which allows continuous monitoring, control and operational capability of the satellites.

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[5] Space Daily, "Space Station Using GPS In Altitude Control: The Global Positioning System, used in a wide variety of applications on Earth, is performing a new task in space. It is determining the attitude, position and speed of the International Space Station."; Online available at <www.spacedaily.com> (Date accessed 05/06/2002).

[6] The US 2001 Federal Radionavigation Sytems, Published by the US Department of Defense and the Department of Transportation, DoT-VNTSC-RSPA-01-3.1/DoD-4650.5, p. 108. Online available at <http://www.igeb.gov/FRS2001.pdf > (Date accessed 04/02/2002).

[7] Information Note of the European Commission. Directorate General for Energy and Transport. "Galileo. An imperative for Europe", p. 1. Information provided via e-mail by Mr. Marco Ferrazzani, from the European Space Agency [Hereinafter ESA] Legal Bureau. It was available at <http://www.europa.eu.int/comm/energy_transport/en/gal_doc_en.html#top> (Date accessed 04/02/2002); Also see the US 2001 Federal Radionavigation Sytems Space Users Segment, p. 45, *supra* 6.

These GNSS satellites constellations are typically located in a Medium Earth Orbit[8] (MEO). Although there is no specific number of satellites required to form a GNSS constellation, the average for a global coverage ranges from 20 to 30 satellites.[9] If these satellites were placed in the Geo-Stationary Orbit (GEO) a number between 3 and 4 satellites could be enough to achieve worldwide coverage. The reasons why it is not viable to place GNSS satellites in GEO orbit are the following:[10]

- The time required for the signal to get from the GEO to the terminal distorts the accuracy of the service;[11]
- One of the characteristics of GNSS signals is that they are very weak in nature. Therefore, the greater the distance from the satellite to Earth, the higher the risk of interference with the signal. Consequently, larges, more powerful satellites, terminals, and augmentation and precision systems would be required to achieve the same results in GEO. Moreover, MEO satellites can be of small and medium size, which permits fitting and launching more than one satellite at a time in every launch vehicle. MEO satellites also permit the production of small and more economical hand-held terminals;
- A significant amount of energy is required for transmitting from the GEO, resulting in a significant shortening of the useful life of the satellite.[12]

Despite all these factors, which militate against placing GNSS satellites in GEO, it is worth mentioning the tremendous benefits that GEO placement would bring in terms

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[8] UNISPACE Report 1982 on The Geostationary Satellite Orbit; edited by K.-H. Bockstiegel & M. Benko *Space Law, Basic Documents,* Institute of Air & Space Law at Cologne University, Vol. 1/1 B.IV.2 and B.IV.1 (Drodrecht / Boston / London: Martinus Nijhoff Publishers Medium, 1996) [Hereinafter Space Law, Basic Documents]; Medium Earth Orbits [Hereinafter MEO] and Geostationary Satellite Orbit [Hereinafter GEO]; GEO is placed at an aproximate altitude of 35,871 kms above the Earths' equator.

[9] The US GPS navigation system is composed of 24 active and 3 spare satellites in a 20,200 km height orbit. On the other hand, the Russian GLONASS is composed of a constellation of currently 10 satellites at a height of 19,100 km over the Earth. Please visit the United States Department of Defense website. Online information available at: <http://www.defenselink.mil/news/Jul1999/n07081999_9907082.html> (date accessed 10/02/2002).

[10] Information and technical explanations provided via e-mail by Mr. Angel Malo Poyatos (25/02/2002), Telecommunications Engineer, University of Málaga, Spain. A copy in original Spanish is available upon request <rodriguezpablo@hotmail.com>.

[11] See Malo, *ibid.* It takes in the order of 1/4 of a second for the radio-signal to do a round trip to GEO, at an aproximate distance of 36,000 km.

[12] Information provided by Mr. Jean-Pierre Charron, during a field trip of the Institute of Air & Space Law, McGill University, to the Canadian Space Agency David Florida Labs, (Ottawa 15/03/2002).

of fuel and energy conservation as well as reduction of potential space debris. Technical research to achieve results from GEO equivalent to those achieved as from MEO should therefore be encouraged.

It is also pertinent to mention the benefits that navigation by satellite will bring to its multiple users. Although satellite navigation may seem especially relevant for air navigation purposes, it is important to bear in mind that aviation represents just a small slice of the cake. The applications of GNSS are, broadly, the following:[13]

- Automobile navigation: GNSS can be used for on board navigation, fleet management, roadside assistance or stolen vehicle recovery. For instance, since GPS-based tracking systems were installed in Oslo taxis drivers are able to serve ten times more clients than they could with regular radio-based systems.
- Recreation: GNSS could be used with portable receivers for fishermen, hunters, cyclists, etc., and could be integrated into cellular telephony. Recreational facilities, such as golf courses or ski resorts, could also benefit from GNSS technology.
- Surveying and mapping: GNSS is capable of offering sub-centimetre accuracy which might be ideal for rural electrification planning, telecom tower placement, pipelines, oil, gas or mineral exploration and flood plain mapping.[14] For instance, Electricidade de Portugal Group uses GPS to survey the border of the Alqueva dam (Portugal).
- Tracking of goods and machinery control: Tracking of packages, monitoring cargo delivery, fleet and asset management, timing and control of farming, mining and

[13] J. Y. Kim, Senior Policy Analyst, Office of Space Commercialization, US Department of Commerce, "The Global Positioning System, a Worlwide Information Utility" (November/December 2000). Online available at <http://www.igeb.gov/outreach/iberia-main.ppt> (Date accessed 08/07/2002) at slides 11 et seq. Also see the ESA/EU Commission Brochure "Galileo, The European Program for Global Navigation Services" at pages 13 et. seq. and 19 et seq. Online available at <http://ravel.esrin.esa.it/docs/GalileoBrochure.pdf> (Date accessed 10/07/2002). Also see Galileo Applications online at <http://www.europa.eu.int/comm/energy_transport/en/gal_what_en.html> (Last updated: 13/02/2002) (Date accessed 08/02/2002); Also see ESA website on navigation at <http://www.esa.int/export/esaSA/GGGOMBs50NDC_navigation_0.html> (Last updated 24/10/2000) (Date accessed 08/07/2002).

[14] T. Moore "River level monitoring using GPS heighting" PowerPoint Presentation for the Second United Nations/United States of America Regional Workshop on the Use of Global Navigation Satellite Systems, "The Use and Applications of Global Navigation Satellite Systems" Hosted by the Government of Austria and the Austrian Space Agency, Co-sponsored by the European Commission. G/H Halls, Austria Center Vienna, Austria (26 to 30 November 2001) [Hereinafter PowerPoint presentation on GNSS]; Online at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker02/sld001.htm> (Date accessed 08/07/2002).

construction equipment, are all potential applications of GNSS. For instance FGC in Barcelona and GRUPISA in Madrid (Spain).

- Public services: GNSS applications in this area include transportation management and infrastructure,[15] emergency response, fire fighting, search and rescue services, and boundary mapping and enforcement,[16] *e.g.*, a GPS-based automated toll system controls traffic on highways in Germany.
- Aviation: GNSS can perfectly suit the needs of en-route navigation, airport approaches and take-off and landing manoeuvres, and could permit more efficient flight routing and closer spacing of planes thus increasing the airspace capacity, which is known as 'free flight';[17] GNSS would also permit a better tracking of aircrafts that would enhance safety.
- Maritime navigation:[18] GNSS improves vessel tracking and traffic management, which increases safety and commerce. DGPS service for enhanced GPS accuracy is already available in thirty-four countries.
- Military: GNSS has special applications in precision and 'smart' weapons. In addition, most of the civilian uses have military counterparts.

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[15] Z. Szabady, "Some Hungarian GPS applications in transportation." PowerPoint presentation on GNSS; <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker02/sld002.htm> (Date accessed 08/07/2002).

[16] G. Busics, "The present and future role of GNSS in the state border registry: Hungarian experience." PowerPoint presentation on GNSS. Information available online at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker04/sld001.htm> (Date accessed 08/07/2002).

[17] Mr. W. Frank Price, Alternate Representative, Air Navigation Commissioner of the US Mission to ICAO, on an interview held at ICAO HQ on the 3rd of June 2002: 'Free flight' is going to be one of the most visible benefits of the use of GNSS, and will be in aviation where it will deem to have on of the highest economical impacts: Fuel reduction, time reduction and increased safety are just three of the most visible consequences of free flight. Nevertheless 'Free-flight' will be slowly implemented and will go step by step. It will take in the order of 20 to 30 years to be fully operational. For further extended information on the subject, see R. C. Keel and K. B. Levine "US Airlines on course for free flight." Journal of Air Law and Commerce [Hereinafter JALC] Vol. 62 (1997), p. 675. Also see G. M. Moore and J. D. Caven "Free flight Technology requirements and liability issues that may arise for equipment manufacturers" JALC Vol. 62 (1997), p. 687. Also see B. Elder "Free flight: The future of Air transportation entering the twenty-first century." JALC Vol. 62 (1997), p. 871. Also see A. K. Lawter "Free Flight or Free Fall?" JALC Vol. 62 (1997), p. 915.

[18] D. Glass, "Using GPS for maritime transportation." PowerPoint presentation on GNSS. Online at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker01/sld001.htm> (Date accessed 08/07/2002). Also see H. Rohde, "The introduction of GNSS for maritime purposes." PowerPoint presentation on GNSS. Information available online at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session08/part_c/speaker02/sld001.htm> (Date accessed 08/07/2002).

- Timing:[19] GNSS enhances telecommunications network synchronization and management; and is also useful for electrical power grid management as well as digital signatures for e-commerce.
- Scientific research: Geodetic, geodynamic[20] and oceanic studies; monitoring geological changes;[21] monitoring and tracking wildlife; climatologic[22] and atmospheric modeling;[23] agricultural monitoring.[24] These can all benefit from GNSS technology.
- Environmental management:[25] GNSS is also used in forestry and wetlands management, natural resources management, fisheries boundary enforcement; endangered species preservation; and hazardous material cleanup. For instance Laos has a timber-harvesting program in which GNSS data is used, with the result that the economic and environment conditions of the country have improved.
- Space applications: GNSS provides orbit and attitude control for spacecraft. Satellite formation flying, space launch safety; advance land-observing satellite, also use

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[19] J. Nawrocki, "Benefit and problems of high precision time: comparison of atomic clocks using GPS." PowerPoint presentation on GNSS. Information available online at the UN Office for Outer Space Activitites;
<http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker04/sld001.htm> (Date accessed 08/07/2002).

[20] J. Sledzinski, "Satellite navigation systems in geodetic and geodynamic programmes initiated and coordinated by the Central European Initiative (CEI): results and achievements of the long-term international cooperation of 17 CEI countries." PowerPoint presentation on GNSS. Online available at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker01/sld001.htm> (Date accessed 08/07/2002).

[21] R. Weber, "GPS and Earth Science." PowerPoint presentation on GNSS. Online at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker02/sld001.htm> (Date accessed 08/07/2002).

[22] T. Hlasny, "Using GPS for climatology and geoecology." PowerPoint presentation on GNSS. Online at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker05/sld001.htm> (Date accessed 08/07/2002).

[23] K. Legat, "APIS - Air Pollution Information System." PowerPoint presentation on GNSS. Online at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker05/sld001.htm> (Date accessed 08/07/2002).

[24] R. Vintila, "Agriculture monitoring at the parcel scale using GPS and multi-temporal remote sensing data in the framework of the ADAM Project." PowerPoint presentation on GNSS. Online available at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session03/speaker01/sld001.htm> (Date accessed 08/07/2002). Also see M. Rasher "The use of GPS and mobile mapping for decision-based precision agriculture."
<http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session03/speaker02/sld001.htm> (Date accessed 08/07/2002).

[25] G. Huseynov, "Designing and planning of aerospace experiments with GPS for monitoring critical environmental zones of Azerbaijan." PowerPoint presentation on GNSS. Online available at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker04/sld001.htm> (Date accessed 08/07/2002).

GNSS to calibrate high-resolution radar maps. For example GPS is currently being used to monitor and control the *ISS*[26] in orbit altitude.

It is important to point out that in Europe in 1999 the satellite navigation market was 40 million euros, while the road vehicle navigation market was around 700 million euros, and personal the navigation and cartography markets were 50 million euros each.[27] The U.S. Office of Space Commercialization anticipates the worldwide sale of GPS goods and services will reach U.S.D 9 billion by the end of 2002[28] and 16 billion by the end 2003.[29]

Finally, and before briefly examining the satellite-based radio-navigation systems, it is important to define four terms[30] in order to understand the importance of the GNSS signal and the relevance of signal failures in terms of liability:

- Accuracy: In radio-navigation the 'accuracy' of an estimated craft is defined as the degree of conformity of the measured position with the true position of the craft. A statement of accuracy is meaningless without a statement of the certainty in position that applies.
- Availability: This term refers to the percentage of time that the service is available to the user within the coverage area.
- Coverage: Coverage is the surface area or volume where the GNSS signals are adequate for a user to receive them and determine his position with a given level of accuracy.

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[26] See Space Daily, *supra* 5.

[27] Commission of the European Communities. Brussels 22.11.2000 COM (2000) 750 final. Commission Communication to the European Parliament and the Council on Galileo, page 1 of Annex 1. EU Commission, DG Energy and Transport, Information available online at the EU website <http://www.europa.eu.int/comm/energy_transport/library/gal_com_2000_750_en.pdf> (Date accessed 08/07/2002).

[28] J. Y. Kim, "The Global Positioning System. A Worldwide Information Utility" Office of Space Commercialisation, US Department of Commerce, (April 11, 2002) PowerPoint presentation, slide 10; online available at <http://www.ta.doc.gov/space/library/speeches/2002-04-11-AMRAD.ppt> (Date accessed 14/07/2002).

[29] See J. Y. Kim, *supra* 13.

[30] See US 2001 Federal Radionavigation Sytems, *supra* 6. These definitions are found, among other definitions, in the Appendix A, p. A1- A8.

- Integrity: Integrity is the ability of the system to warn users when the signal is not adequate for navigation.

2. *The U.S.'s Global Positioning System*

The U.S. Global Positioning System program (GPS), formerly known as the Navstar Global Positioning System, was initiated in 1973 to reduce the proliferation of navigation aids, and it became fully operational in 1995.[31] After the removal of the Selective Availability control from the intentionally distorted Standard Positioning System (SPS) announced by President Clinton on May 2000,[32] GPS's NAVSTAR satellites are accurate up to ten meters horizontally. Nevertheless, one must bear in mind that the U.S. Government has maintained the capability of reactivating Selective Availability as an answer to security concerns, and that the possibility of implementing Selective Availability in the next generation of GPS satellites is maintained.[33]

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[31] See A. Pozo-Ruz, A. Ribeiro, M. C. García-Alegre, L. García, D. Guinea, and F. Sandoval, "Sistema de Posicionamiento Global (GPS): Descripción, Análisis de Errores, Aplicaciones y Futuro", Instituto de Automática Industrial, Consejo Superior de Investigaciones Científicas, 28500 Arganda. Madrid (Spain) [In original Spanish; "Global Positioning System (GPS): Description, Errors analysis, Applications and Future." Institute of Industrial Automatics of the Spanish Supreme Council on Scientific Research. Online available at <http://www.iai.csic.es/users/gpa/postscript/Pozo-Ruz00a.pdf > (Date accessed 08/07/2002); Also see the information on GPS at the US Federal Aviation Administration website <http://gps.faa.gov/gpsbasics/gps_basics-text.htm> (Date accessed 08/07/2002).

[32] Statement by the President regarding the United States' decision to stop degrading Global Positioning System Accuracy: "Today, I am pleased to announce that the United States will stop the intentional degradation of the Global Positioning System (GPS) signals available to the public beginning at midnight tonight. We call this degradation feature Selective Availability (SA)." Online available at <http://gps.faa.gov/gpsbasics/PresPolicy-text.htm#1> (Date accessed 08/07/2002). The disconnection of the Selective Availability will continue to feed the explosive growth of GPS applications. This decision was based upon a recommendation made by the Secretary of Defense in coordination with the Departments of State, Transportation and Commerce, the Central Intelligence Agency (CIA). Also see Annual Report to the President and the Congress. William S. Cohen, Secretary of Defense Report of the Secretary of Defense to the President and the Council Online: <http://www.defenselink.mil/execsec/adr2001/adr2001.pdf> (Date accessed 08/07/2002).

[33] See "The European Dependence on US-GPS and the Galileo Initiative" p. 2 and 3; *supra* 2; On the other hand, on " Sept. 17, 2001, the Interagency GPS Executive Board (IGEB), which governs the GPS system, announced the United States has no intent to ever use Selective Availability again." Online information at the Federal Aviation Administration website <http://gps.faa.gov/Links/index.htm> (Date accessed 14/07/2002).

GPS is managed by the Interagency GPS Executive Board (IGEB),[34] which is a senior-level policy making body co-chaired by the U.S. Department of Defence[35] and the Department of Transportation. The IGEB was established in 1996 by a Presidential Directive to manage the Global Positioning System and its augmentation systems. Members of the IGEB include the Departments of State, Commerce, Interior, Agriculture, and Justice, as well as NASA[36] and the Joint Chiefs of Staff. Although it is jointly managed by the Department of Defence and the Department of Transportation, it is ultimately controlled by the U.S. Department of Defence.[37]

Because of the weakness of GPS signals and the demands of the civil sector a series of augmentation systems has been established in the U.S. to guarantee and enhance the availability and accuracy of the signals. Those systems which have or will be established include: DGPS[38], WAAS[39], LAAS[40] and CORS.[41]

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[34] The White House, Office of Science and Technology Policy, National Security Council, For Immediate Release, March 29, 1996 Contact: (202) 456-6020, Fact Sheet U.S. Global Positioning System Policy, March 29, 1996: "A permanent interagency GPS Executive Board, jointly chaired by the Departments of Defence and Transportation, will manage the GPS and U.S. Government augmentations. Other departments and agencies will participate as appropriate. The GPS Executive Board will consult with U.S. Government agencies, U.S. industries and foreign governments involved in navigation and positioning system research, development, operation, and use." Online available at <http://www.ostp.gov/NSTC/html/pdd6.html> (Date accessed 08/07/2002).

[35] For further information see US 2001 Federal Radionavigation Systems, *supra* 6. This document is prepared both by the US DoD and DoT and covers common-use radionavigation systems: it refers to the DoD and DoT responsibilities, the civil users requirements and standards for: air, maritime, land and space based users. In addition it also refers to the levels of performance for non-navigation applications such as geodesy and surveying, mapping, charting and geographical information systems, geophysical applications, meteorological applications, timing and frequency. The study concludes that augmentation is required for almost all of the radionavigation uses, p. 55.

[36] National Aeronautics and Space Administration [Hereinafter NASA], directly created after the launching of the Soviet Satellite Sputnik <http://history.nasa.gov/sputnik/> (Date accessed 08/07/2002) through the National Aeronautics and Space Act of 1958; Online information available at NASA website <http://www.hq.nasa.gov/office/pao/History/spaceact.html> (Date accessed 08/07/2002).

[37] See US Code, Title 10, Armed Forces; Subtitle A, General Military Law; Part IV, Service, Supply, and Procurement. Chapter 136: Provisions Relating to Specific Programs Sec. 2281. Global Positioning System: "The Secretary [of Defense] shall [...] a) (2) ensure that United States armed forces have the capability to use the GPS effectively despite hostile attempts to prevent the use of the system by such forces. [...] b) (5) may not agree to any restriction on the Global Positioning System proposed by the head of a department or agency of the United States outside the Department of Defense [hereinafter DoD] in the exercise of that official's regulatory authority that would adversely affect the military potential of the Global Positioning System. [...]". Online available at <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC2281> (Date accessed: 08/07/2002).

[38] US 2001 Federal Radionavigation Systems at 63-64, see *supra* 6: Differential corrections to the basic GPS measurements, based upon accurate acknowledge of the geographic position of one or more geodetically fixed reference stations, thus computing corrections to GPS measurements. One the corrections have been done, they are transmitted to the GPS receivers. FAA LAAS and WAAS, USCG Maritime DGPS service, and Nationwide DGPS (NDGPS) have employed this method.

As an additional safety measure available for the air sector, the DOD informs GPS aircraft users of a disruption in the service through the Notice to Airmen,[42] which is available both nationally and internationally. Unfortunately, NOTAM is meaningless to a pilot unless there is a method to interpret the effects of a GPS satellite outage on the intended operation. Such a possibility is provided by Receiver Autonomous Integrity Monitoring (RAIM), which needs 5 satellites simultaneously in view in order to function. Unfortunately, as the 24-satellite GPS constellation was not designed for this purpose, RAIM is not always available even if all the satellites are operational.[43]

To conclude, the modernization of GPS has just begun with the recently launched GPS II Blocks and the development of the next generation GPS III system.[44]

3. *The Russian Federation's Global Navigation Satellite System GLONASS*

The first GLONASS satellite was launched on October 10, 1982.[45] Although the GLONASS system is managed and operated by the Russian Space Forces, it provides significant benefits to the civil community. GLONASS has two types of navigation signals: the standard precision navigation signal (SP) and the high precision navigation signal (HP). SP positioning and timing services are offered to all civil GLONASS users

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[39] US 2001 Federal Radionavigation Systems Aeronautical, see *supra* 6, p. 7: GPS Wide Area Augmentation System (WAAS): This system will augment the GPS signal and will provide 3 services: integrity data on GPS and GEO satellites; wide area differential corrections; and additional ranging capability. It will consist on one or more GEO satellites, and several ground stations.; Also see W. F. Price, *supra* 17: WAAS is currently operating in a tes-based phase.

[40] US 2001 Federal Radionavigation Systems, see *supra* 6, p. 74: GPS Local Area Augmentation System (LAAS). It will be a safety critical precision and navigation landing system to augment the GPS signal. LAAS will use multiple receivers references and their antennas in the nearby of airports.; Also see W. F. Price, *supra* 17: LAAS is on prototype pre-operational phase.

[41] US 2001 Federal Radionavigation Systems, see *supra* 6, p. 76-77: National Continuously Operating Reference Stations (CORS) is an augmentation system for non-navigation purposes established by National Geodetic Survey/NOAA. It will not need to have an independent network of stations, but rather it will use other group's stations.

[42] US 2001 Federal Radionavigation Systems, see *supra* 6, p. 97, GPS Notice to Airmen [Hereinafter NOTAM] will inform at least 48 hours before, if it has been planned, or as soon as possible if it is unexpected.

[43] US 2001 Federal Radionavigation Systems, see *supra* 6, p. 97.

[44] See Kim, *supra* 28.

[45] GLONASS history <http://www.rssi.ru/SFCSIC/english.html> (Last updated March 10/03/1999) (Date accessed 09/07/2002).

on a continuous, worldwide basis and provide the capability to obtain horizontal positioning accuracy to within 57-70 meters (99.7% probability), vertical positioning accuracy to within 70 meters (99.7% probability), velocity vector components measuring accuracy to within 15 cm/s (99.7% probability) and timing accuracy to within 1 mks (99.7% probability).[46] Results may be significantly enhanced by the use of differential modes of navigation and special methods of measurements.[47] As of August 12, 2002, the GLONASS constellation is composed of five active satellites.[48] Although it is the intention of the Russian Government to have fully deployed the GLONASS satellite constellation[49] by 2006, budget constrains indicate that this goal may not be achieved by that date.[50]

4. *The European Union's Galileo*[51]

Galileo is the European civil[52] project for navigation by satellite. It will consist of a series of 30 satellites (27 active and 3 spare) orbiting in three circular Medium Earth Orbit planes at an altitude of approximately 23,616 km above the Earth and at an

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[46] Aeropuertos Españoles y Navegación Aérea (AENA) (Spanish Airports and Air Navigation) Online information at <http://www2.aena.es/gccc/glonass.htm> (Date accessed 09/07/2002).

[47] Russian Fed. Ministry of Defence; Coordination Scientific Information Centre. Online available at <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

[48] Russian Fed. Ministry of Defence; Coordination Scientific Information Centre. As of August 12th 2002 the GLONASS constellation status reflects 5 active satellites and 2 withdrawn satellites. Online available at <http://www.rssi.ru/SFCSIC/english.html> (Last day accessed 12/08/2002) (Daily updated).

[49] Russian Fed. Ministry of Defence; Coordination Scientific Information Centre. GLONASS Constellation: Fully deployed GLONASS Constellation is composed of 24 satellites in three orbital planes whose ascending nodes ares 120 degrees apArticle 8 satellites are equally spaced in each plane with argument of latitude displacement of 45 degrees. Besides the planes themselves have 15 degrees argument of latitude displacement. Online available at <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002); See also S. V. Kulik, "GLONASS Status and progress." PowerPoint presentation on GNSS. Slides 3 and 19. Information about GLONASS is available online in English at <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session01/part_a/speaker02/sld023.htm> (Date accessed 10/07/2002).

[50] Information provided by Mr. Victor P. Kuriamov, Representative of the Russian Federation on the Council of ICAO, during an interview held on May the 15th 2002 at ICAO HQ, Montreal, Canada.

[51] Complete information under the EU Commission, Directorate General of Energy and Transport, Galileo website: <http://www.europa.eu.int/comm/energy_transport/en/gal_en.html> (Date accessed 10/07/2002)

[52] Council Conclusions on Galileo, 2420th Council Meeting, 7282/02 (Presse 78) Brussels on the 26/03/2002 at p. 20: "The Council agrees: 2. That GALILEO is a civil programme under civil control."; <http://www.europa.eu.int/comm/energy_transport/library/gal_council_concl_03_2002_en.pdf> (Date accessed 09/07/2002).

inclination of 56 degrees with reference to the equatorial plane.[53] Galileo is expected to have an accuracy at least equivalent to that anticipated for the next generation of GPS, *i.e.*, somewhere in between five and ten meters.[54] The service mapping on signals will be set up as follows:[55]

a) The Open Service Signals (OS) will use un-encrypted ranging codes and un-encrypted navigation data messages, and it may be accessed free of direct charge by the mass market;
b) The Safety-of-Life Service (SAS) will use the OS ranging codes and navigation data messages;
c) The Commercial Service (CS) will use the OS ranging codes and navigation data messages, with value-added CS encrypted data messages;
d) The Public Regulated Service (PRS) will use the encrypted PRS ranging code and navigation data messages.

One of the main benefits of Galileo with respect to the other GNSS is that it will also offer integrity monitoring, sending out a warning signal to the receiver around six seconds after the detection of failure of the signal.[56]

The major players involved in Galileo are the European Union, through the Commission and mainly within the Directorate-General for Transport and Energy; and the European Space Agency.[57] Up to certain point, EUROCONTROL[58] also plays a role.

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[53] J. Benedicto, S. E. Dinwiddy, G. Gatti, R. Lucas and R. Lugert "Galileo Satellite System Design and Technology Developments" ESA November 2000 at p. 6. Information online available at <http://ravel.esrin.esa.it/docs/galileo_world_paper_Dec_2000.pdf> (Date accessed 10/07/2002). Also see ESA website on Navigation <http://www.esa.int/export/esaSA/GGGMX650NDC_navigation_0.html> (Last updated 05/04/2002) (Date accessed 10/07/2002).

[54] See "The European Dependence on US-GPS and the Galileo Initiative", see *supra* 2, p. 2 and 3.

[55] EU Commission, Mission High Level Definition of April 3rd 2001, p. 19. Online available at <http://europa.eu.int/comm/energy_transport/library/galileo_hld_v2_03_04_01.pdf> (Date accessed 10/07/2002). Also see Information Note, *supra* 7.

[56] J. Benedicto, S. E. Dinwiddy, G. Gatti, R. Lucas and R. Lugert, see *supra* 53, p. 13.

[57] European Space Agency [Hereinafter ESA]; for history about ESA and its programs visit <www.esa.int> (Date accessed 10/07/2002).

[58] European Organization for the Safety of Air Navigation (EUROCONTROL), Online at <http://www.eurocontrol.int> (Date accessed 10/07/2002); Also see R. D. Van Dam, "Recent Developments at the European Organization for the Safety of Air Navigation (EUROCONTROL)" Annals of Air & Space Law 1998 Vol. XXIII (Montreal, Canada: McGill University, 1998) , p. 309. [Hereinafter Ann. Air & Sp. L.].

The Galileo project officially started with the Tri-partite Agreement,[59] which was based on the EC Treaty, and that was concluded in 1998 among the European Community, the European Space Agency and EUROCONTROL. The aim of this Agreement is to set forth Europe's contribution to the creation of a GNSS, with the EGNOS program [60] as a starting point.[61]

In order to complete the Galileo project, four developing phases have been established:

a) The Definition Phase.[62] During this phase, work has included consultations with a broad range of users involved in a large number of areas, such as

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[59] Agreement between the European Community, the European Space Agency and the European Organization for the Safety of Air Navigation on a European Contribution to the development of a global navigation satellite system (GNSS) EU Official Journal L 194 10/07/1998, p. 16. The Agreement is online <http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_194/l_19419980710en00160024.pdf> (Date accessed 10/07/2002). Also see Communication from the Commission to the Council and the European Parliament: Europe and Space: Turning to a new chapter. Commission of the European Communities, Brussels, 27th September 2000. COM (2000) 597 final, p. 17.

[60] European Geostationary Navigation Overlay System (EGNOS). For more information go to the ESA at <http://www.esa.int/export/esaSA/GGG63950NDC_navigation_0.html> (Date accessed 10/07/2002).

[61] EGNOS is Europe's first venture into navigation by satellite and that will be operational in year 2004. This augmentation system is also known as GNSS-1, as it's the first step towards the achievement of a Global Navigation Satellite System. The European GPS and GLONASS augmentation system EGNOS is based in the Tri-partite Agreement. In this first step towards satellite navigation, the ESA will be in charge of the overall responsibility for the design and operation of the system, the EU Commission is responsible for international cooperation and coordination and will make sure that it benefits the entire transport segment. Finally, EUROCONTROL is defining the needs of aviation and is also playing a major role in testing the system. The cost of the system is estimated to be in the order of 300 million euros. The augmentation system will be comprised of three geostationary satellites and a network of ground stations. EGNOS will give reliability and will augment the signal both of GLONASS and GPS, to within an accuracy of 5 meters. It will be fully operative in year 2004, and in the mean time a test-signal is being broadcasted by two INMARSAT satellites make users to get familiarized with the system and test its usefulness. This is also known as the EGNOS System Test Bed (ESTB), which is the EGNOS prototype (For further information visit ESA, EGNOS System Test Bed online <http://www.esa.int/export/esaEG/estb.html> (Date accessed 21/03/2002). EGNOS has been broadcasting a Signal in Space (SIS) since February 2000. It is used to support and test the development of the EGNOS system, to demonstrate EGNOS to potential users, to prepare for the introduction of EGNOS and to test the possibility of expanding this system outside Europe. The ESTB provides users with a GPS-augmentation signal that enables them to calculate their position to an accuracy of within a few meters. This SIS has already been used to guide an aircraft landing at Nice Airport on September the 25th to the 27th 2001, <http://www.esa.int/export/esaEG/ESARMKJUWSC_estb_0.html> (date accessed 21/03/2002)). It is also important to note that the three planned augmentation systems WAAS, MSAS and EGNOS are said to become interoperable. For that reason Interoperability Working Groups have already been established among this three Satellite-based Augmentation Systems (SABS). Online information at: <http://www.esa.int/export/esaSA/ESAF530VMOC_navigation_0.html>. Interoperability tests succeeded in 1998, 1999 and 2000. Last updated 3 January 2002. (Date accessed 21/03/2002). Finally, EGNOS enters into manufacturing phase; Online <http://www.esa.int/export/esaSA/ESAZABOED2D_navigation_0.html> (Last updated 08/07/2002) (Date accessed 10/07/2002).

[62] EU Council Resolution of 19 July 1999, on the involvement of Europe in a New Generation of Satellite Navigation Services – Galileo- Definition phase. (1999/C 221/01) Official Journal of the European

aviation, the railways, the maritime sector, road-linked applications, applications involving the general public, scientific applications and time-distribution applications;[63]

b) Once the final go-ahead political decision has been made,[64] the Development and In-orbit Validation Phase begins.[65] Within this second phase, from two to four satellites will be built and deployed for in-orbit validation, and the construction of the ground segment will also start.[66]

c) The third phase, called the Deployment Phase, will begin in 2006 and will consist of the construction and deployment of the remaining satellites and the installation of the completed ground segment.[67]

d) Finally, the Commercialization Phase will start in 2008 and will mark the beginning of commercial operations.[68]

Communities C221/ 1, p. I, 03/08/1999. Online information about Galileo available at <http://www.genesis-office.org/documents/990617%20Resolution%20Galileo-EN.pdf> (Date accessed 10/07/2002)

[63] A number of projects and comprehensive studies have contributed to this phase: GALA for the overall architecture definition; GEMINUS to support the GALILEO service definition; INTEG for EGNOS (European Geostationary Overlay Service) integration into Galileo; SAGA to support the GALILEO Standardisation process; GalileoSat for the space segment architecture definition; GUST related to GALILEO receivers pre-specification and certification; SARGAL related to potential SAR (Search and Rescue) applications of Galileo. Some of these proyects may be find online at <http://www.europa.eu.int/comm/energy_transport/en/gal_how1_en.html#1> (Date accessed 10/02/2002)

[64] See Council Conclusions on Galileo, 2420th Council Meeting, 7282/02 (Press 78), p.19-20; "The Council agrees: 1.To launch the Development phase of the Galileo project [...]" *Supra* 52.

[65] Nevertheless two major activities related to the definition phase are still taken place: "Phase B2 of the GalileoSat study led by ESA focuses on the consolidation of mission and system requirements, system architecture and finalisation of phase B activities leading to the Preliminary System Design Review (PSDR). GALILEI is an activity funded by the European Commission. It has the purpose of defining the overall service and user approach for GALILEO, complementing the studies performed by ESA in the frame of the GALILEO definition phase, in particular on following topics: architecture of GALILEO Local Components and customisation for some key applications, interoperability between GALILEO and other systems (GNSS, GSM/UMTS, etc.), co-ordination and protection of frequencies used by GALILEO, standardisation and certification aspects, market observatory of applications using GALILEO , definition of the legal, regulatory and institutional framework of GALILEO." Online information at <http://www.europa.eu.int/comm/energy_transport/en/gal_how1_en.html#1> (Last updated: 16/04/2002) (Date accessed 10/07/2002).

[66] See ESA/EU Commission Brochure "Galileo, The European Program for Global Navigation Services", *supra* 13, p. 31.

[67] See ESA/EU Commission Brochure "Galileo, The European Program for Global Navigation Services", *supra* 13, p. 31.

[68] During the deployment phase, about 28 satellites will have to be launched in a period of less than 2 years: "The size and mass of the satellites under consideration for this type of mission should ensure optimum deployment of the constellation through multiple satellite launches (from to 2 to 8 satellites per launch, depending on launcher capacity and deployment constraints)." Online information available at <http://www.europa.eu.int/comm/energy_transport/en/gal_how_en.html> (Last updated: 20/03/2002) (Date accessed 10/07/2002); Also see J. Benedicto, S. E. Dinwiddy, G. Gatti, R. Lucas and R. Lugert, *supra* 53, p.

The cost of Galileo is estimated to be in the order of 3.4 to 3.6 billion Euros, and funding will come mainly from the ESA and from the EU general budget.[69] A Galileo Joint Undertaking[70] has also already been approved and created,[71] thus making feasible the entry of the private sector into the program[72] through the so-called Public Private Partnership.[73] Even though the final institutional framework of Galileo has not yet been designed, several proposals are currently being considered, such as the creation of a Galileo Agency, together with a private company that would be in charge of the commercial aspects of Galileo.[74]

From my point of view, a solution similar to the one reached with ARIANE is desirable. Arianespace has 53 shareholders,[75] and ESA is also involved in its management, as it has a consultative vote in quality of censor[76] and ensures the

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9: In order to permit the above mentioned multiple launching, Galileo satellites will "weight some 650 kg in final orbit [...] and the satellite geometry [...] has been designed for launch of multiple satellites with ARIANE or similar launcher."

[69] *PricewaterhouseCoopers* study: "It confirms previous estimations on the costs of GALILEO: € 3.6 billion to complete the infrastructure of the system, on the assumption of a « worst case scenario » that includes significant contingencies and spare satellites." A summary of this study is available online at <http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/01/1637|0|AGED&lg=EN> (Date accessed 10/07/2002).

[70] The 'Galileo Joint Undertaking' finds its legal basis under Article 171 of the Treaty of Amsterdam, see *infra* 548 and 549.

[71] Council Regulation (EC) No. 876/2002 of May 21 2002, Setting up the Galileo Joint Undertaking [and also providing with its Statutes]. Official Journal of the European Communities L 138/1 (28/05/2002). Online available at <http://www.europa.eu.int/comm/energy_transport/library/gal_r876_2002_en.pdf> (Date accessed 10/07/2002).

[72] Council Regulation (EC) No. 876/2002 of May 21 2002, Statutes of the Galileo Joint Undertaking, Article 3 b): " The following may become members of the Joint Undertaking: - The European Investment Bank; - Any undertaking, after the Commission has, under Article 4 of the Council Regulation (EC) No. 876/2002 of 21 May 2002 setting up the Galileo Joint Undertaking, informed the Council of the outcome of the tendering procedure, and after approval in accordance with the procedure set out in Article 5 of that Regulation." This Council Regulation is available online at the EU website <http://www.europa.eu.int/comm/energy_transport/library/gal_r876_2002_en.pdf> (Date accessed 10/07/2002).

[73] S. Andries, "The European initiative Galileo: An European contribution to the Global Navigation Satellite System (GNSS)." Ann. Air & Sp. L. Vol. XXV, p. 50 (McGill University 2000 Montreal, Canada).

[74] See GEMINUS studies on Galileo, online available <http://www.genesis-office.org/indexd.htm> (Date accessed 10/07/2002).

[75] Arianspace's shareholders base is composed of 41 manufacturers and engineering companies from 12 European countries, 11 banks and 1 Space Agency. Online available at <http://www.arianespace.com/us/about/share.htm> (Date accessed 10/07/2002).

[76] V. Kayser, *Launching Space Objects: Issues of Liability and Future Prospects* (Drodrecht / Boston / London: Space Regulations Library, Kluwer Academic Publishers 2001), p. 139.

compliance of Arianespace with the provisions of the Outer Space Treaty of 1967,[77] the ESA Convention and the ESA/Arianespace Declaration, which is not publicly available.[78] Another important mechanism of control is found in the Sales Control Committee, which deals with sales by Arianespace to non-ESA-member-States. This Committee is in charge of deciding whether such sales are in accordance with the provisions of the Outer Space Treaty.[79] Finally, the ESA/Arianespace Declaration grants each Member States the right to remove itself from the launch, thus giving Member States some measure of control (lobby) over Arianspace.[80]

This system offers all control and management guarantees that may be needed for Galileo as well as the benefits inherent to a private entity. The creation of a commercial company, which would naturally flow from the Galileo Joint Undertaking, together with an Agreement among ESA, EU Commission and the said company similar to the ESA/Arianespace Declaration, would satisfy not only the requirements of commercialization, but also of sovereignty, management and control. In addition, following the Arianespace's model, Governments could be shareholders of the said commercial company, and still retain direct governmental control over it, if so is desired.

5. *International Cooperation*

The interoperability among GPS, GLONASS and Galileo does not imply their interdependency. Independence and interoperability of the three systems is of the utmost importance for the end user, as these would reduce the vulnerability of each of the systems, due to the improbability of having a simultaneous triple failure take place. In monetary terms, it should also help keep the costs of services and related equipment at a balanced level, as the actual "*de facto* natural monopoly"[81] of GPS will be reduced. With this aim, a Signal Task Force has been created by the EU Commission to deal with the

[77] See Outer Space Treaty 1967, *infra* 213.
[78] See Kayser, *supra* 76, p. 139: ESA/Arianespace Declaration was renewed in 1999.
[79] See Kayser, *supra* 76, p. 139-140.
[80] See Kayser, *supra 76*, p. 140.
[81] M. Milde, "Solutions in search of a problem? Legal aspects of the GNSS." Ann. Air & Sp. L., Vol. XXII-II, p. 195 (McGill University 1997 Montreal, Canada), at page 197.

frequencies of Galileo.[82] This group is in charge of supporting the design of Galileo's frequency and signal plans as well as of seeking interoperability with GPS and GLONASS. The group consists of a number of experts nominated by the EU Member States, and representatives of the national frequency authorities and the ESA.[83]

The chosen band for Galileo is the lower, middle and upper L-band (1 – 2 GHz).[84] Galileo will use the same centre frequencies as GPS,[85] therefore providing interoperability between the two systems. The degradation of GPS signals in L1 is minor to the 0.25 dB established by the International Telecommunications Union (ITU).[86] It is important to note that the frequencies were assigned by the ITU at the last World Radio Conference (WRC) that took place in Istanbul in the year 2000.[87]

From the U.S. point of view, international cooperation started from the moment when the U.S. offered the service to the international community free of direct charges.[88] In addition the U.S. offered GPS to ICAO[89] and IMO,[90] and they also signed a Joint Statement for GPS based augmentations with Japan in September of 1998.[91] Moreover, continued talks have been taking place over the past few years with the Russian Federation and consultations with the EU take place on a regular basis. A Draft

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[82] EU Commission, Directorate General of Energy and Transport. Online The Galileo Frequency Structure and Signal Design, p. 2; Information available online available at the EU website <http://www.europa.eu.int/comm/energy_transport/library/gal_stf_final_paper.pdf > (Date accessed 05/02/2002).

[83] The Galileo Frequency Structure and Signal Design, see *ibid.* This task force was established in March 2001.

[84] R. Jakhu and V. Rodríguez Serrano, "International Regulation of Radio Frequencies for Space Services", Law of Space Applications (Air and Space Law Applications). Documents and Materials, IASL McGill (September 2001) Vol. I, p. 169.

[85] The Galileo Frequency Structure and Signal Design On E5a (L5) and E2-L1-E1 (L1), p. 1; *supra* 82.

[86] The Galileo Frequency Structure and Signal Design, p. 4; *supra* 82.

[87] The Galileo Frequency Structure and Signal Design, *Ibid.* Also see Commission of the European Communities, 08.03.2000 COM (2000) 86 Final. Communication from the Commission to the Council, the European Parliament, the Economic and Social committee and the Committee of the Regions. The European Positions for the World Radiocommunications Conference 2000 (WRC-2000). Online available at <http://www.genesis-office.org/documents/CMR%202000%20en.pdf> (Date accessed 10/07/2002).

[88] See Kim, *supra* 13.

[89] International Civil Aviation [Hereinafter ICAO] <www.icao.org>; also see Addison *infra* 117.

[90] International Maritime Organization [Hereinafter IMO] , <www.imo.org>; Also see *infra* 120.

[91] Japan is currently developing its own GPS-based augmentation system, called Multi-Functional Transport Satellite (MTSAT). More information on the website of the Ministry of Land, Infrastructure and Transport of Japan at <http://www.mlit.go.jp/koku/ats/e/mtsat/role/01.html> (Date accessed 10/07/2002); Also see Kim, *supra* 28.

Agreement was presented to the Commission on October 5, 2000.[92] In May 2001 the EU submitted a counter-proposal and a meeting took place in April/May 2002.[93] U.S. goals for cooperation are, in the first place, to protect the interests and investments of the GPS user base (no degradation of service, no user fees, interoperability and backwards compatibility); to protect national security interests (DOD/NATO Denial capabilities, no overlay of M-Code, control over technology transfer, movement of any military discussion about Galileo to NATO); to ensure a level playing field for commerce; and to maximize the benefits of a possible combined GPS-Galileo service.[94]

The Russian perspective can be seen in the Russian/EU Satnav Cooperation negotiation process.[95] Russia made an offer to the EU in December 2000, including a proposal to share a common civil signal structure, and suggested joint development of some parts of the navigation payload, of the satellite structure and of atomic clocks.[96]

In conclusion it can be stated that what the three current cooperation programs seek is primarily to achieve interoperability among the systems. The main problems lie in the disagreements over a common signal structure and standardization of the signal and GNSS receivers. One of the main issues of the future could be the imposition by any of the three GNSS players of specific technical standards, in order to prevent the others from competing in a given market.

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[92] R. Braibanti and J. Y. Kim, "GPS-Galileo Negotiations: Commercial Issues at Stake" Briefing to the US GPS Industry Council, Sunnyvale, California, March the 21st 2002. Online available at <http://www.igeb.gov/outreach/USGIC-presentation-final.ppt> (Date accessed 10/07/2002).
[93] See Braibanti and Kim, *ibid.*
[94] See Kim, *supra* 28.
[95] See Kulik, *supra* 49 slides 22 *et seq.*
[96] See Kulik, *supra* 49 slide 28.

Chapter II. *GNSS Liability Regime and Public International Law.*

The objective of the present chapter is to examine those liability issues arising from damage caused by GNSS. This chapter will analyze the liability regimes applicable to satellites malfunctions and signal malfunctions. This study will be carried out from a public international law perspective. Although direct collisions are also covered by this study, no direct reference will be made to them as it is widely accepted the application of international and space law to a collision between space objects, a collision between a space object and an aircraft, or the collision of a space object with the surface of the Earth.

1. *Introduction: Some considerations on Public International Law.*

International law deals with rights and obligations of States and other international legal entities, such as international organizations. Much has been written and said about international law and its legal status. Doubts have emerged about its classification as law, mainly due to the lack of a truly efficient method of implementing it. As is commonly known, international law will go only as far as States permit it to go; international law is thus a reflection of the will of States and the *consensus* theory.[97] At this point it is significant to cite a statement made during the *travaux préparatoires* of the 1972 Convention on International Liability for Damage Caused by Space Objects,[98] affirming, "International Law is merely what individual States Members of the International Community say it is."[99]

1.1 *Sources of Law. Treaty Law and Customary Law.*

As defined by Article 38 of the Statute of the International Court of Justice,

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[97] H. Kelsen, *Principles of International Law* (New York: Rinehart & Company, Inc., 1966), p. 201: "If, nevertheless, one define international law as an interstate law, it is because this definition does not refer to the specific object of international law, but to the procedure of its creation. This procedure is characterized by the fact that the norms of international law are created by the collaboration of two or more states."
[98] Liability Convention 1972, see *infra* 228.
[99] UN Doc. A/AC105/PV. 95, p. 75; Mr. Reis (US) interpreting the USSR position.

> The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply: a) international conventions, whether general or particular, establishing rules expressly recognized by the contesting states; b) international custom, as evidence of a general practice accepted as law; c) the general principles of law recognized by civilized nations; d) subject to the provisions of Article 59,[100] judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law. 2) This provision shall not prejudice the power of the Court to decide a case *ex aequo et bono,*[101] if the parties agree thereto.[102]

This Article 38 is considered a reflection of sources of international law, also known as '*sources formelles*',[103] and so has been extensively accepted by the doctrine.[104] Moreover, Article 38 establishes a legal hierarchy among the different sources that will be taken into account when deciding the laws applicable to a particular case.

Treaty Law has the highest authority and is the supreme source of international law. Treaty Law is based in the equal sovereignty of States[105] as well as on their willingness to regulate their relations and occasionally to bind themselves to a higher and/or common will. Only the parties to a Treaty will be bound by it and shall comply with its terms in good faith, in with the principles of *pacta sum servanda* recognized in Article 26 and of *pacta tertiis nec nocent nec prosunt* of Article 34 of the 1969 Vienna Convention on the Law of the Treaties.[106] Nevertheless, there exist some norms that are universally legally binding, even upon those States that have not expressly agreed to

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[100] See Statute of the ICJ, Article 59: "The decision of the Court has no binding force except between the parties and in respect of that particular case." *Infra* 101.

[101] Black's Law Dictionary, 17th edition (1999) B. A. Garner, Editor in Chief. West Group, St. Paul, Minnesota: "According to what is equitable and good; [judges] are not bound by legal rules and may follow equitable principles."

[102] International Court of Justice [hereinafter ICJ] Online information and Statute <http://www.icj-cij.org/icjwww/ibasicdocuments/ibasictext/ibasicstatute.htm> (Date accessed 02/06/2002).

[103] P.M. Dupuy, *Droit International Public* (Paris: Ed. Dalloz, 1995), p. 195.

[104] See Dupuy, *ibid.*: Article 38 "[...] est generalment cité dans le contexte doctrinal précité pour présenter la typologie des sources du droit international."

[105] *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 43: "By sovereignty, we understand the whole body of rights and attributes which a State possesses in its territory, to the exclusion of all other States, and also in its relations with other States. Sovereignty confers rights upon States and imposes obligations on them."

[106] Vienna Convention on the Law of Treaties of 1969 [Hereinafter Vienna Convention 1969]. Date of entry into force 1980. Casebook on Public International Law Vol. II, p. 351 (McGill University, Montreal 2001) 1155 U.N.T.S. 331, section 2. Available online at the United Nations website <http://www.unog.ch/archives/vienna/vien_69.htm> date accessed 02/06/2002. Article 26: "*Pacta sunt servanda:* Every treaty in force is binding upon the parties to it and must be performed by them in good faith." Article 34: "A treaty does not create either obligations or rights for a third State without its consent."

them. These norms are known as norms of *jus cogens*, and they present an *erga omnes* character and will be analyzed in brief.

A Treaty is defined by Article 2.1 a) of the Vienna Convention, as

> An international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation.[107]

Although it may seem from this definition that a treaty must be concluded in written form, the Vienna Convention permits and recognizes in its Article 3 the existence of non-written treaties and of treaties not governed by the Convention, which are, however, deemed subject to the international law and principles that the Vienna Convention recognizes.[108] For this reason international law remains open to questions of form and language, which means that issues important to GNSS, such as the legal status of unilateral declarations of States, may emerge.[109] In regard to this subject, the Permanent Court of International Justice took the view in the *Eastern Greenland* case that an oral agreement based on a unilateral declaration could have legal effects and that, in *Eastern Greenland*, Norway was legally bound by such a statement.[110] Furthermore in the *Nuclear Tests* cases of 1974,[111] three unilateral statements on the side of France to cease

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[107] See Vienna Convention 1969, *ibid.*

[108] See Vienna Convention 1969, *ibid.* As pointed out in the Preamble, the Vienna Convention acts as a codification of general rules and customary international law, reaffirming such law and recognizing the applicability of customary law and rules of *jus cogens* outside the Convention. Article 3: "The fact that the present Convention does not apply to international agreements concluded between States and other subjects of international law or between such other subjects of international law, or to international agreements not in written form, shall not affect: a) the legal force of such agreements; b) the application to them of any of the rules set forth in the present Convention to which they would be subject under international law independently of the Convention; c) the application of the Convention to the relations of States as between themselves under international agreements to which other subjects of international law are also parties."

[109] D. Alland, Droit International Public (Paris: Presses Universitaires de France, 2000), p. 311: «L'acte unilatéral de l'État se définit comme un acte juridique, c'est-a-dire comme la manifestation de volonté d'un sujet de droit, l'État, destinée a produire de effets juridiques, et prise en compte par le droit international»

[110] V. Epps, *International Law*, (Durham North Carolina: Carolina Academic Press, 2001), p. 35 commenting on the *Eastern Greenland* case (1933) PICJ, Ser A/B, No 53.

[111] *Nuclear Tests* Cases: *Australia v. France* 1974 I.C.J. 253, 261: "It is clear from these statements that if the French Government had given what could have been construed by Australia as 'a firm, explicit and binding undertaking to refrain from further atmospheric tests', the applicant Government would have regarded its objective as having been achieved."; *New Zealand v. France* 1995 I.C.J. 288, 289-290: "It is most likely that the Court intended to refer to the declarations constituting legal obligations, by which France had entered into a binding commitment not to carry out further atmospheric nuclear tests in the South Pacific region [...]".

its atmospheric nuclear tests in the Pacific were considered binding by the Court, which consequently dismissed the case. Moreover when the Court reconsidered this argument in the *Nuclear Test* cases of 1995,[112] it reached a similar conclusion. Likewise, in *Nicaragua v. US* the Court declared "that such declarations may involve legal effects, some of which it has defined in previous decisions (Nuclear Tests, United States Diplomatic and Consular Staff in Tehran cases)."[113] Finally, in the *Frontier Dispute* case the Court also accepted the fact that unilateral statements carry legal consequences.[114] These cases show that unilateral statements can have legal consequences when they 1) demonstrate clear evidence of the intention to be legally bound; 2) and are made to the whole international community.[115] In the opinion of Professor Cassese an international promise may become an international obligation and a unilateral statement must be understood as a "unilateral declaration by which a State undertakes to behave in certain manner."[116]

Therefore, it is doubtful that, *e.g.*, the GNSS services that were unilaterally offered by the U.S. and the Russian Federation to ICAO[117] -and therewith to the world aviation community- would not entail any legal obligation at all, regardless of the capacity of ICAO to conclude an international agreement. As it can be read in both proposals, the U.S. Federal Aviation Administration submitted its letter in "*lieu* of an

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[112] *Nuclear Test* 1995 I.C.J. 288, 289-290: "it is most likely that the Court intended to refer to the declarations constituting legal obligations, by which France had entered into a binding commitment not to carry out further atmospheric nuclear tests in the South Pacific region."

[113] *Nicaragua v. United States* (The Merits) 1986 I.C.J. 14, 43: "[...] the Court would recall that such declarations may involve legal effects, some of which it has defined in previous decisions (Nuclear Tests, United States Diplomatic and Consular Staff in Tehran cases). Among the legal effects which such declarations may have is that they may be regarded as evidence of the truth of facts, as evidence that such facts are attributable to the States the authorities of which are the authors of these declarations and, to a lesser degree, as evidence for the legal qualification of these facts. The Court is here concerned with the significance of the official declarations as evidence of specific facts and of their imputability to the States in question."

[114] *Frontier Dispute* case (*Burkina Faso v. Mali*) 1986 ICJ 554, 597: "The Chamber now comes to the problem of the interpretation and significance of the 1935 exchange of letters." 1986 ICJ 554, 598: "The Chamber is considering only the question whether, as claimed, letter 191 CM2 was of an amending or declaratory nature [...]" 1986 ICJ 554, 600: "In the view of the Chamber, it is clear from these comments that the commandants de cercle started from the idea that the text submitted to them was intended to define the existing boundary [...]" 1986 ICJ 554, 601 "The Chamber therefore takes the view that the alteration made to the sketch-map between 1926 and 1946 is evidence of the declaratory purport of letter 191 CM2."

[115] See Alland, *supra* 109.

[116] A. Cassese, *International Law* (Oxford: Oxford University Press , 2001), p. 151.

[117] H. Addison, *GNSS Legal framework,* (IASL LL.M Thesis McGill University - 1996), Appendix 5, p. 156: US Offer of GPS to ICAO dated 14th October 1994 and Appendix 6 at p. 157: Russian Federation of GLONASS to ICAO, dated 20th February 1996.

agreement" while the Russian Federation's proposal states that "in case of confirmation by ICAO, this letter and your [ICAO] reply will represent a mutual agreement between the Government of the Russian Federation and the International Civil Aviation Organization concerning the GLONASS satellite navigation system."[118] Additionally, one year before this letter, the Russian Federation Decree of March 7, 1995 stated that the

> Ministry of Transportation of the Russian Federation jointly with Ministry of Defence of the Russian Federation, Russian Space Agency and State committee on the defence-oriented industry are to submit to ICAO and IMO the necessary materials to prepare the agreements for the use of the GLONASS system as an element of the international global navigation system for the civil users and to provide interaction with above-mentioned organizations in the process of use the GLONASS system.[119]

Furthermore, the International Maritime Organization has accepted the Russian and the American invitations to use their radio-navigation satellite signals, thus extending the compromise to the global maritime community.[120] Nevertheless, in case of conflict or doubt regarding the binding nature of a unilateral statement, the Courts should make the final decision whether a given unilateral statement creates any international obligation on the maker.

Customary law is the other main source of international law. It has been defined by the Statute of the International Court of Justice as "evidence of a general practice

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[118] See Addison, US and Russian Offers to ICAO, *ibid.*

[119] The Government of the Russian Federation. The Decree from March 7, 1995 number 237, Moscow "On Executing Works in Use of the GLONASS Global Navigation Satellite System for the Sake of Civil Users". [Emphasis added] Available at the Russian Fed. Ministry of Defence; Coordination Scientific Information Centre: GLONASS Policy. Online available at <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

[120] IMO SN/Circ.187, of 13th of December 1996 (Ref. T2/2.07), Recognition of The Global Navigation Satellite System (GLONASS) as a Component of the World-Wide Radionavigation System: "1)At its sixty-seventh session (2 to 6 December 1996), the Maritime Safety Committee, pursuant to operative paragraph 4 of resolution A.815(19) on the World-Wide Radionavigation System, recognized the Global Navigation Satellite System (GLONASS), proposed by the Government of the Russian Federation, as a component of the World-Wide Radionavigation System. 2) The Committee's decision was based on the recommendation and assessment made by the Sub-Committee on Safety of Navigation at its forty-second session (15 to 19 July 1996). The NAV Sub-Committee assessed the offer of the Russian Federation Administration in accordance with the requirements of the Annex to resolution A.815 (19), and agreed that the GLONASS meets the operational requirements of the Appendix to that resolution for navigation in other waters (general navigation)." In very similar terms see also the IMO SN/Circ. 182, of 13th of June 1996 (Ref. T2/2. 07) Recognition of the Global Positioning System Standard Position Service (GPS-SPS) as a Component of the World-Wide Radionavigation System: Information provided via e-mail on the 17/07/2002 by Ms. Marianne Harvey, from IMO. Available upon request <rodriguezpablo@hotmail.com>.

accepted as law."[121] According to this assessment, customary law will only apply if the two following elements are present:

a) Evidence of the actual practice of States or *usus* or *diuturnitas*;[122] and

b) The judgment on the part of States that the said practice is in accordance with the law, also known as the *opinio juris necessitates.*[123]

Therefore, in order to prove the existence of a customary rule, evidence of a State practice must be provided. Such evidence can be found in the behaviour of States in the international arena as well as in statements made by a State Government such as executive decisions, legislative enactments or municipal decisions, statements made to the press, to legislative assemblies or to international organizations and correspondence between foreign ministries.[124]

Another important issue is that of the duration of the practice; how long does it take for a practice to become an international custom? The answer to this question is not clear. Although in the *North Sea Continental Shelf* case the Court did not regard a short duration as an insurmountable obstacle,[125] in the *Asylum* case the Court required a "constant and uniform usage".[126]

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[121] See Statute of the ICJ, Article 38 b); *supra* 101.

[122] See Cassese *supra* 116, p. 119.

[123] See Alland, supra 109, p. 268: «C'est ce que l'on appelle *l'opinio juris*, c'est-a-dire la conviction que l'on agit suivant le droit».

[124] *Nicaragua v. United States* (The Merits) 1986 I.C.J. 14, 41: "The material before the Court also includes statements by representatives of States, sometimes at the highest political level. Some of these statements were made before official organs of the State or of an international or regional organization, and appear in the official records of those bodies. Others, made during press conferences or interviews, were reported by the local or international press. The Court takes the view that statements of this kind, emanating from high-ranking official political figures, sometimes indeed of the highest rank, are of particular probative value when they acknowledge facts or conduct unfavourable to the State represented by the person who made them. They may then be construed as a form of admission." 1986 I.C.J. 14, 44: "[...] the Court may take account of public declarations to which either Party has specifically drawn attention, and the text, or a report, of which has been filed as documentary evidence. But the Court considers that, in its quest for the truth, it may also take note of statements of representatives of the Parties (or of other States) in international organizations, as well as the resolutions adopted or discussed by such organizations, in so far as factually relevant, whether or not such material has been drawn to its attention by a Party."

[125] *North Sea Continental Shelf* Case (Federal Republic of Germany / Denmark; Federal Republic of Germany / Netherlands) 1969 ICJ 3, 43: "Although the passage of only a short period of time is not necessarily, or of itself, a bar to the formation of a new rule of customary international law on the basis of what was originally a purely conventional rule, an indispensable requirement would be that within the

The concept of 'persistent objector' to the formation of customary law also deserves a brief comment. At a time when a custom is coming into being, a State may react in three different ways: by doing nothing, that is with silence or acquiescence; by objecting to the practice from the very beginning, that is as a persistent objector; and finally, by objecting to the practice once it has become a custom. While a rule may be formed through acquiescence, a crystallized customary law does not bind persistent objector States, once their initial and continuous objection is verified.[127]

Referring to Outer Space, Professor Cheng points out that international customary law "has been applicable to outer space from the very beginning."[128] Moreover, some of the most important UN resolutions and treaties on Space Law make express reference to international law, which obviously includes customary law.[129]

1.2 *Other sources of international law. Peremptory principles of general international law and norms of jus cogens.*

Although sometimes seen as secondary sources of law, the importance of general principles of law, decisions of the tribunals and the opinions of the most relevant publicists play a very important role in the creation of international law and should not be underestimated. They are recognized in Article 38 of the Statute of the ICJ, and in many occasions such secondary sources make difference in international law, since they are used as a supporting arguments in unclear issues and they may also help to interpret a rule of higher status.

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period in question, short though it might be, State practice, including that of States whose interests are specially affected, should have been both extensive and virtually uniform in the sense of the provision invoked; -and should moreover have occurred in such a way as to show a general recognition that a rule of law or legal obligation is involved."

[126] *Asylum case* (*Colombia v. Peru*) 1950 I.C.J. 266, 276: "[...] The rule invoked by it is in accordance with a constant and uniform usage practised by the States in question [...]".

[127] J. O'Brien, *International Law*, (London, Sydney: Cavendish Publishing Limited, 2001), p. 76 and 77.

[128] D. Maniatis, "The law governing liability for damage caused by space objects: from State responsibility to Private entity" Ann. Air & Sp. L. 1997 Vol. XXII-I , p. 374, quoting Professor Cheng (McGill University 1997 Montreal, Canada).

[129] See Maniatis, *ibid.*

According to Article 38.1 c) of the Statute of the ICJ, the Court may appeal to "[...] the general principles of law [...]".[130] J. O'Brien states that based on this provision some jurists seek to incorporate natural law into international law.[131] Nevertheless, "the majority view holds that the purpose of the provision was to enable the Court to take principles recognized in national law and to apply them in appropriate situations if their application appears relevant to the resolution of an international dispute."[132]

It is important to note that the use of general principles of law is a common practice in the resolution of cases by the ICJ, and that they have been employed as a fundamental part of Court's legal arguments in some important cases, such as the *Chorzow Factory* case,[133] the *Eastern Carelia* case,[134] or in the well known *Corfu Channel* case.[135]

The principle of norms of *jus cogens* is also a relevant topic in public international law. Norms of *jus cogens* are rules arising from customary law or treaty law and recognized by the international community as legally binding. They are considered basic rules that cannot be modified or derogated either by treaty law or by customary law, unless a treaty law or customary law turned into an opposite and posterior norm of *jus cogens*. Although this is possible in theory, in practice it would be difficult for a norm of *jus cogens* to be modified or derogated by an emerging norm of *jus cogens* because this type of rules are the very fundaments of law. The importance of these norms is noted in Article 53 of the Vienna Convention, which states that a norm of *jus cogens* is

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[130] See Statute of the ICJ, *supra* 102.
[131] See O'Brien *supra* 127, p. 85.
[132] See O'Brien *supra* 127, p. 86.
[133] See Epps, *supra* 110 commenting on the *Chorzow Factory* case (1928) PCIJ, Ser A, No. 17 bb.
[134] *Eastern Carelia* case (1923) PCIJ, Ser B, No. 5 bb.
[135] *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 21: "The obligations incumbent upon the Albanian authorities consisted in notifying, for the benefit of shipping in general, the existence of a minefield in Albanian territorial waters and in warning the approaching British warships of the imminent danger to which the minefield exposed them. Such obligations are based, not on the Hague Convention of 1907, No. VIII, which is applicable in time of war, but on certain general and well-recognized principles, namely: elementary considerations of humanity, even more exacting in peace than in war; the principle of the freedom of maritime communication; and every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States." (Date accessed 03/06/2002) For further information on the topic see I. Chŏng, *Legal problems involved in the Corfu Channel incident*, (Genève, E. Droz, - 1959).

> A norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.[136]

Article 64 enhances the power of a norm of *jus cogens* by declaring void and terminating any existing treaty in conflict with any new peremptory norm of general international law.[137]

Difficulty arises in determining which rules should be considered *jus cogens* and how such rules form. From a reading of the *Barcelona Traction* case,[138] one can conclude that norms of *jus cogens* would be mainly those referring to genocide, aggression, discrimination, use of force and basic human rights. In this case the two main characteristics of norms of *jus cogens* are identified as universality and solidarity.[139] In the *Corfu Channel* case, the Court affirms that "To-day, owing to social interdependence and to the predominance of the general interest, the States are bound by many rules which have not been ordered by their will."[140] Regrettably, although these are considered norms of *jus cogens*, it is no secret that continual violations of such fundamental rights occur even in the oldest or most advanced democracies.

1.3 *Interpretation of Treaties. The 1969 Vienna Convention on the Law of the Treaties of 1969.*

Interpretation of Treaties is a crucial issue in international law. Despite the fact that the legal personnel of States or of international organizations draft treaties, they

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[136] See Vienna Convention 1969; *supra* 106.
[137] See Vienna Convention 1969; *supra* 106.
[138] Case Concerning the Barcelona Traction, Light and Power Company, Limited (New Application: 1962) (Belgium v. Spain) 1970 I.C.J. 3, 32: "an essential distinction should be drawn between the obligations of a State towards the international community as a whole, and those arising vis-a-vis another State in the field of diplomatic protection. By their very nature the former are the concern of all States. In view of the importance of the rights involved, all States can be held to have a legal interest in their protection; they are obligations *erga omnes*. 34. Such obligations derive, for example, in contemporary international law, from the outlawing of acts of aggression, and of genocide, as also from the principles and rules concerning the basic rights of the human person, including protection from slavery and racial discrimination."
[139] M. Ragazzi, *The concept of International Obligations Erga Omnes,* (Oxford: Clarendon Press Oxford - 1997), p. 17, commenting on the *Barcelona Traction* case, the two characteristics are: universality, that is, they are binding without exceptions, and solidarity, meaning that each country is deemed to have a legal interest to protect them.
[140] *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 43.

ultimately reflect the will of States -or the will of Governments, which is not always the same- and, as such, the language of treaties is left open to different interpretations, thus providing Governments with a way out if needed.

Interpretation of treaty law will therefore be an essential tool when analyzing the Outer Space Treaty of 1967,[141] and even more when examining the Liability Convention of 1972, both in relation to GNSS.

The basic means of interpreting treaties are compiled in the Vienna Convention of 1969.[142] Nevertheless, it is important to remember that the said 1969 Convention represents a codification of the existing customary law regarding the law of the treaties,[143] and that the means of interpretation and the law of the treaties set forth by the Convention is applicable only for those States parties to the Convention. In contrast any relationship between States not party to the Convention falls under international customary law.

Part III of the Vienna Convention contains a section title "*Observance, application and interpretation of treaties*". Article 31 of this Part III provides the general rule of treaty application: "A treaty shall be interpreted *in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose* [...]".[144] Additionally, any agreement relating to the treaty to be interpreted or any instrument made in connection with the conclusion of that treaty shall also be considered. Paragraph 3 of Article 31 declares that any subsequent agreement between parties to a treaty or any practice that arises between them regarding the interpretation of the treaty and other any relevant rules of international law applicable in the relations between the parties shall also be taken into account. Recourse to supplementary means of interpretation, such as *travaux préparatoires* and the

[141] See Outer Space Treaty 1967, *infra* 213.
[142] See Dupuy, *supra* 103: La Convention "a fait ouvre utile et qu'il était difficile d'aller plus loin dans un texte de codification générale du droit des traites."
[143] See Vienna Convention 1969, Preamble: "Believing that *the codification* and progressive development of the law of treaties *achieved in the present Convention* will promote the purposes of the United Nations set forth in the Charter [...]" [Emphasis added] *supra* 106.; Also see Alland, *supra* 109, p. 217: « [La Convention de Vienne de 1969] a codifié l'ensemble des règles relatives a la conclusion, l'entré en vigueur, la remise en cause, etc. des traites internationaux. »
[144] See Vienna Convention 1969, Article 31 [Emphasis added]; *supra* 106.

circumstances surrounding the moment of conclusion of the treaty, is also poossible when the "meaning is ambiguous or obscure; or leads to a result which is manifestly absurd or unreasonable."[145] Finally, Article 33 deals with the interpretation of treaties authenticated in two or more languages.[146]

1.4. *The relationship between International Law and Domestic Law.*

International Law and Domestic Law have always appeared to exist in two different legal planes. For the purpose of this thesis, it is important to analyse their relationship and their interaction,[147] because private law liability is regulated by the interplay of international law and the domestic law.[148] It should not be forgotten that, although international law rules the relationship between subjects of the international community - States and International Organizations-, in many countries treaty law takes precedence even over Constitutional texts and compliance with or breach of treaty law in the domestic plane can carry both domestic and international consequences.[149]

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[145] See Vienna Convention 1969, Article 32 [Emphasis added]; *supra* 106.

[146] See Vienna Convention 1969, Article 33: "1) When a treaty has been authenticated in two or more languages, the text is equally authoritative in each language, unless the treaty provides or the parties agree that, in case of divergence, a particular text shall prevail. 2) A version of the treaty in a language other than one of those in which the text was authenticated shall be considered an authentic text only if the treaty so provides or the parties so agree 3) The terms of the treaty are presumed to have the same meaning in each authentic text. 4) Except where a particular text prevails in accordance with paragraph 1, when a comparison of the authentic texts discloses a difference of meaning which the application of Articles 31 and 32 does not remove, the meaning which best reconciles the texts, having regard to the object and purpose of the treaty, shall be adopted." *Supra* 106.

[147] V. S. Vereshchetin, "International Space Law and Domestic Law: Problems of Interrelations." Journal of Space Law, Vol. 9, Nos. 1 & 2 (1981), p. 31 *et seq.*

[148] See D. Maniatis, *supra* 128, p. 369.

[149] Constitution of Spain of 1978. Article 95: "Conflict with Constitution: (1) The conclusion of an international treaty which contains stipulations contrary to the Constitution shall require a prior constitutional revision". Article 96: "Amendment, Abolishment: (1) Validly concluded international treaties once officially published in Spain shall constitute part of the internal legal order. Their provisions may only be abolished, modified, or suspended in the manner provided for in the treaties themselves or in accordance with general norms of international law." Available online in Spanish at the Spanish Congress of Deputies website <http://www.congreso.es/funciones/constitucion/titulo_3_cap_3.htm> English version available at the website of the University of Wurzburg (Germany) at <http://www.uni-wuerzburg.de/law/sp00000_.html> (Date accessed 03/06/2002); United States Constitution of 1787 Article VI, sec 2: "[...] all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding." Online available at <http://www.archives.gov/exhibit_hall/charters_of_freedom/constitution/constitution_transcription.html> (Date accessed 03/06/2002); Russian Federation Constitution of 1993. Article 15: "Supreme Law: [...]4) The commonly recognized principles and norms of the international law and the international treaties of the

As we have already seen, international tribunals may consider the judgments of national courts in the proper circumstances. But, may domestic Courts consider International Law in their judgments? Two approaches have been taken:

- The doctrine of incorporation or monism:[150] This approach maintains that international law and domestic law are both parts of the same system. Therefore a treaty may become part of national law once it is concluded in accordance with the Constitutional rules of a country, without a need for further legislation or any other domestic legislative development. This kind of treaty is called a self-executing treaty. Referring to self-executing treaties, the Supreme Court of California affirmed, "In order for a treaty provision to be operative without the aid of implementing legislation and to have the force and effect of a statute, it must appear that the framers of the treaty intended to prescribe a rule, that standing alone would be enforceable in the courts."[151] Some other considerations, such as language, nature of obligations or specific circumstances may also be taken into account by the courts on a case-by-case basis to determine whether a treaty is self-executing or not.[152]
- The dualist approach, or the doctrine of transformation:[153] According to this theory, state law and international law are part of different systems. Therefore a rule of international law will not become part of the domestic law of a state unless, and until, precise local legislation is enacted to implement it.

In a few words, a dualist approach would require of further special legislation to implement an otherwise self-executing treaty, while under a monist method the implementation of the Treaty would be immediate without additional requirements once the treaty has entried into force.

Russian Federation are a component part of its legal system. If an international treaty of the Russian Federation stipulates other rules than those stipulated by the law, the rules of the international treaty apply." Online at <http://www.uni-wuerzburg.de/law/rs00000_.html> (Date accessed 03/06/2002).

[150] A. Aust, *Modern Treaty Law and Practice* (Cambridge: Cambridge University Press, 2000), p. 145.

[151] *Sei Fuji v. State of California* (1952) 38 Cal (2nd) 718, 722. Also see Head Money Cases [*Edye v. Robertson*], 112 U.S. 580, 598 [5 S.Ct. 247, 254, 28 L.Ed. 798]; *Whitney v. Robertson,* 124 U.S. 190, 194 [8 S.Ct. 456, 458, 31 L.Ed. 386]; *Cook v. United States,* 288 U.S. 102, 118-119 [53 S.Ct. 305, 311, 77 L.Ed. 641]; *Valentine v. United States,* 299 U.S. 5, 10 [57 S.Ct. 100, 103, 81 L.Ed. 5]; *Bacardi Corp. v. Domenech,* 311 U.S. 150, 161 [61 S.Ct. 219, 225, 85 L.Ed. 98].).

[152] See Aust *supra* 150, p. 159.

[153] See Aust *supra* 150, p. 145 and O'Brien *supra* 127, p. 113.

1.5 *Breach of International Obligations and Consequences.*

A breach of international obligations occurs when a State fails to comply in good faith with any of the dispositions established in a treaty, in customary law or any other obligations which that State is under.[154] Although it may be thought that a breach of international obligations should imply physical damage to a third State, this is not a *conditio sine qua non*, and the simple failure to comply with an international obligation or a misuse of a right may also imply a breach of international law with the subsequent duty to make reparation.[155] This issue is not covered in the Vienna Convention of 1969, and the law governing this topic is customary law. For a long period of time the UN International Law Commission[156] decided not to deal with this issue.[157] Recently, in November 2001, the ILC published a set of draft Articles on the Responsibility of States for Internationally Wrongful Acts,[158] as well as on International Liability for injurious consequences arising out of acts not prohibited by international law (prevention of transboundary damage from hazardous activities).[159]

This section will deal with the first series of draft Articles, while the Articles referring to "acts not prohibited" will be discussed in Section 2.2 of the present Chapter.

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[154] *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 45: "An unlawful act is one which disregards or violates the rights of a State, or which is contrary to international law, to a treaty, etc."

[155] *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 47: "Formerly, the misuse of a right had no place in law. Anyone could exercise his rights to their fullest extent, even if the effect was prejudicial to others; in such cases there was no duty to make reparation. That is no longer the case." 1949 ICJ 4, 48: "In this matter there are two questions to be determined: (a) when is there a misuse of a right; and (b) what should be the penalty? In regard to the former point, the facts must be evaluated in any given case; and in regard to the penalty, this may consist, according to the circumstances, of an apology, a rebuke or even compensation for the injury caused. The misuse of a right-in the same way as responsibility-admits of extenuating circumstances [...]".

[156] International Law Commission [Hereinafter ILC] online at <http://www.un.org/law/ilc/> (Date accessed 04/06/2002).

[157] See Aust *supra* 150, p. 300.

[158] See ILC *supra* 156. Draft Articles on "the Responsibility of States for Internationally Wrongful Acts" [Hereinafter ILC Draft Articles for Wrongful Acts] adopted in November 2001 by the ILC at its 53rd Session Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10 (A/56/10) chap. IV. E. 1. Online available at <http://www.un.org/law/ilc/texts/State_responsibility/responsibilityfra.htm> (date accessed 04/06/2002).

[159] See ILC *supra* 156. Draft Articles on "Prevention of transboundary damage from hazardous activities" [Hereinafter ILC Draft Articles on Hazardous Activities] adopted in November 2001 by the ILC at its 53rd Session Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10 (A/56/10) chap. E.1. Online available at <http://www.un.org/law/ilc/texts/prevention/preventionfra.htm> (Date accessed 04/06/2002).

Articles 1 and 2 comment on the international responsibility of States for wrongful acts when they state that "*Every* internationally wrongful act of a State entails the international responsibility of that State",[160] and describe the elements of a wrongful act as the conduct –either an action or an omission- that is attributable to the State under international law and that constitutes a breach of an international obligation of the State. The statement '*every* internationally wrongful act of a State' may indicate the existence of a norm *erga omnes* and the recognition of such norm as a rule of customary law. Consequently, failing to comply with any of the obligations of a Treaty by action or omission, *e.g.* the Liability Convention of 1972,[161] would be seen as a breach of treaty law and would carry international consequences. Similarly, a breach of customary law will have the same result. Thus a breach of the international law general principle of giving warning in case of emergency or danger, or failure to compensate for damage caused by a State's activities,[162] could also have international consequences for the non-compliant State. It is also important to mention draft Article 14.2 that asserts that a breach having a continuous character will "extend[s] over the entire period during which the act continues and remains not in conformity with the international obligation."[163] Finally, Article 14.3 declares that a breach of the obligation requiring a State "to prevent a given event occurs when the event occurs and extends over the entire period during which the event continues and remains not in conformity with that obligation."[164] Therefore, failing to comply - by action or omission - with any of the provisions of the Liability Convention or the Outer Space Treaty during a prolonged period of time would not mean that either of them is no longer valid or that a contrary customary law has been formed, it would mean that a continuous breach of the provisions of the said Treaties would be taking place.

Before mentioning the consequences of a breach of international law, it is worthwhile to note that neither general law nor international law, award those who do not raise an objection to a wrongful act. This is stated in Article 20, "Valid consent [...] to the commission of a given act [...] precludes the wrongfulness of that act [...] to the extent

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[160] See ILC Draft Articles for Wrongful Acts, Article 1 [Emphasis added], see *supra* 158.
[161] This will be analyzed in Section 4 of the present Chapter.
[162] These concepts will be further analyzed in Section 2 of the present Chapter.
[163] See ILC Draft Articles for Wrongful Acts, Article 14.2; *Supra* 158.
[164] See ILC Draft Articles for Wrongful Acts, Article 14.3; *Supra* 158.

that the act remains within the limits of that consent."[165] Unfortunately, the draft Articles do not define 'valid consent'. Is mere silence 'valid consent'? Should there be a need for express written consent?

The consequences of a breach of international obligations can be summarized as follows:

- Continued duty of the responsible State to perform the obligation breached.[166]
- Obligation to cease the act and to assure non-repetition.[167]
- Obligation to make full reparation for any injury caused, including *any damage*, whether material or moral.[168] Reparation must be in the forms of restitution,[169] compensation[170] or satisfaction.[171] Interest shall be payable when necessary and is calculated from the date the sum should have been paid.[172]
- Countermeasures are regulated under Part III, Chapter II, from draft Articles 49 to 54. Although Article 52.1 *(b)*[173] encourages negotiation, an injured State may "take such urgent countermeasures as are necessary to preserve its rights".[174] Chapter III limits the application of countermeasures: they are only to be taken to induce a State to comply with its international obligations; they are also limited in time to the non-performance period;[175] and they must be proportionate to the gravity of the wrongful act.[176] The responsible State shall be notified in advance of any countermeasures,[177] which shall not affect the law embodied in the Charter of the United Nations.[178]

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[165] See ILC Draft Articles for Wrongful Acts, Article 20; *Supra* 158.
[166] See ILC Draft Articles for Wrongful Acts, Article 29; *Supra* 158.
[167] See ILC Draft Articles for Wrongful Acts, Article 30; *Supra* 158.
[168] See ILC Draft Articles for Wrongful Acts, Article 31 [Emphasis added]; *Supra* 158.
[169] See ILC Draft Articles for Wrongful Acts, Article 35; *Supra* 158.
[170] See ILC Draft Articles for Wrongful Acts, Article 36; *Supra* 158.
[171] See ILC Draft Articles for Wrongful Acts, Article 37; *Supra* 158.
[172] See ILC Draft Articles for Wrongful Acts, Article 38; *Supra* 158.
[173] See ILC Draft Articles for Wrongful Acts, Article 52; *Supra* 158.
[174] *Ibid.*
[175] See ILC Draft Articles for Wrongful Acts, Article 49; *Supra* 158.
[176] See ILC Draft Articles for Wrongful Acts, Article 51; *Supra* 158.
[177] See ILC Draft Articles for Wrongful Acts, Article 52; *Supra* 158.
[178] See ILC Draft Articles for Wrongful Acts, Article 50; *Supra* 157.

- Circumstances precluding wrongfulness are outlined in Part I, Chapter V, including the consent of the State,[179] self-defence, countermeasures, *force majeure*, distress, necessity and compliance with peremptory norms of general international law.[180] However, these "exceptions" are tempered by draft Article 27 that imposes, despite the above referred exceptions, the duty to comply with the breached obligation once the circumstance precluding wrongfulness is over, and also forces the responsible State to pay for any material loss, leaving aside the moral damage caused.

It seems to be clear that one of the greatest weaknesses of international public law is its lack of an actual direct judicial mechanism to ensure compliance and to enforce its mandates. Although some mechanisms are already available, the will of States is still above them. Hopefully, States may come up with some solutions in the near future. The Dispute Settlement Body within the World Trade Organisation[181] and the recently inaugurated International Criminal Court[182] represent steps in the right direction. Binding decisions, reached through either Arbitrations or the Courts, seems necessary for the proper development of the international community. However, there is still a long way to go.

2. *International Responsibility of States*.

The present section discusses the general responsibility that States bear for damage caused by them to third states, even for non-wrongful acts or omissions.

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[179] *Supra* 162.
[180] See ILC Draft Articles for Wrongful Acts, Article 20 - 26; *Supra* 158.
[181] World Trade Organization, Dispute Settlement Understanding on rules and procedures governing the settlement of disputes, Annex 2 of the WTO Agreement; Dispute Settlement Body: "The dispute settlement system of the GATT is generally considered to be one of the cornerstones of the multilateral trade order. The system has already been strengthened and streamlined as a result of reforms agreed following the Mid-Term Review Ministerial Meeting held in Montreal in December 1988. Disputes currently being dealt with by the Council are subject to these new rules, which include greater automaticity in decisions on the establishment, terms of reference and composition of panels, such that *these decisions are no longer dependent upon the consent of the parties to a dispute.*" [Emphasis added] Online information at <http://www.wto.org/english/docs_e/legal_e/ursum_e.htm#Understanding> (Date accessed 06/08/2002).
[182] The Court entered into force the 1st of July 2002, after 66 States have ratified as April the 11th 2002 (60 was required), online information at the UN website < http://www.un.org/law/icc/index.html > (Date accessed 15/07/2002).

But first, I offer a brief analysis one of the main, and in my opinion most controversial principles of international law: the concept of State immunity.

2.1 *The Concept of State Immunity*

The concept of State immunity is discussed in ILC Draft Articles: "A State enjoys immunity, in respect of itself and its property, from the jurisdiction of the courts of another State subject to the provisions of the present Articles."[183] This concept of immunity traditionally comes from the customary law concepts of sovereignty and equality of States, which maintain that all States are equal and none is superior to the other. These notions are recognized in Article 2 of the Charter of the United Nations that is based on the "sovereign equality of States."[184] The problem with State immunity lies in the possibility for abuses by a State towards its own citizens or towards citizens of third countries, least of the possible consequences of which is injustice.

With respect to State immunity, two tendencies can be observed:[185]

- In the late 19th century absolute immunity of States was adopted. Although intended as absolute, this version of State immunity included cases in which immunity could be waived.[186]
- Restrictive immunity, which draws a line between *acta jure imperii* and *acta jure gestionis*. Under the restrictive theory, waiver of immunity would be granted for acts of State of a commercial or private law nature.[187] This is the approach now taken by the majority of Courts and Nations.[188]

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[183] ILC Draft Articles on Jurisdictional Immunities of States and Their Property, Draft Article 5. Online available at the ILC website <http://www.un.org/law/ilc/texts/jimmfra.htm> (date accessed 05/06/2002)
[184] United Nations Chapter [Hereinafter UN Chapter] Article 2 (specially paragraphs 1,4 and 7) Online available at the UN website <http://www.icj-cij.org/icjwww/ibasicdocuments/ibasictext/ibasicunchArticlehtm> (Date accessed 05/06/2002).
[185] See O'Brien *supra* 127, p. 263 *et seq.*
[186] See O'Brien, *supra* 127, p. 266.
[187] See O'Brien, *supra* 127, p. 267.
[188] Some important examples are the Federal Tort Claims Act in the US, which will be further analyzed in Chapter III Section 2.1. Also important is the European Convention on State Immunity of 1972 which is an international convention setting out when and how member states of the European Union may sue or be sued by other states or by individuals. It is in force only in those EU states that have signed up to the

As pointed out by the U.S. Supreme Court in *Larson v. Domestic and Foreign Corporation* "the principle of sovereign immunity is an archaic hangover not consonant with modern morality and [that] it therefore should be limited wherever possible."[189]

2.2 International Responsibility and Liability as a Rule of Customary Law.

International liability arising from two types of activities may be identified:

a) Liability for non-hazardous activities
b) International liability for hazardous activities

In any nation the violation of a binding rule entails responsibility or liability on the part of the subject breaching the rule, although quite frequently legal binding rules are not equally binding on everybody, nor are equal sanctions imposed. As shown in the previous Section, States are responsible and may be held liable for breaches of general international law.

a) States may be held responsible and liable for damages by acts that even fall within the legal righst of sovereignty. This point can cause some confution. In my opinion, neither responsibility nor liability should *objectively and directly* arise just from damage caused by a legal act unless that act is hazardous. Therefore, if no hazardous act is involved, States should be held responsible and liable only for acts of negligence or for faulty conduct. The point is that there are other principles of general international law that would convert the non-wrongful *regular* act of a State into a wrongful one under some circumstances, *e.g.*, if a duty of care is imposed on a State that it does not fulfil. A breach of a duty of care derives from a regular lawful act that causes damage and for that faulty or negligent conduct a State may be held responsible and liable under international law. However strict liability will arise because of damage caused by a hazardous activity, even

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convention – Information online available at the Council of Europe website <http://conventions.coe.int/treaty/en/Treaties/Html/074.htm> (Date accessed 05/06/2002).

[189] *Larson v. Domestic and Foreign Corporation* (1949) 337 US 682, 703-704: "[...] the principle of sovereign immunity is an archaic hangover not consonant with modern morality and that it should therefore be limited wherever possible. There may be substance in such a viewpoint as applied to suits for [...] damages. The Congress has increasingly permitted such suits to be maintained against the sovereign and we should give hospitable scope to that trend."

if no obligation has been breached. For this reason it is important to study the jurisprudence of the ICJ, as well as to examine which activities shall be considered hazardous and to analize in which circumstances a non-hazardous activity may result in damage. With regard to this second type of activity a study of the duty of care, due diligence and the duty to warn seems a must.

It is well established in international law that States have an obligation to prevent harm to other States. As has been stated in the *Corfu Channel* case the ICJ ruled that even if an act or omission is licit, it might still carry international responsibility.[190] That case dealt with the failure on the part of Albany to alert the UK to the existence of sea-mines in Albanian territorial waters, although Albania, as a sovereign State, has the right to place mines in its territorial waters. This failure to alert resulted in numerous damages, including several British casualties. Another good jurisprudential example is found in the *Trail Smelter* case, in which the international arbitration tribunal affirmed that "under the principles of international law, as well as the law of the United States, no state has the right to use or permit the use of its territory in such a manner as to cause injury [...] to the territory of another, when the case is of serious consequence and the injury is established by clear and convincing evidence."[191] As pointed out by Professor Brownlie, responsibility under international law may emerge from a State "causing, maintaining, or failing to control a source of nuisance to other States."[192]

The field of environmental law offers further examples of possible repercussions of licits acts. For instance in the 1995 *Nuclear Test* cases,[193] France admitted its obligation not to cause [environmental] harm,[194] although insisted on proof of damage

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[190] *Corfu Channel* case, *supra* 135.
[191] P. N. Okowa, *State Responsibility for Transboundary Air Pollution in International Law*, (Oxford: Oxford University Press, 2000), p. 67 and 68 quoting the *Trail Smelter* Case.
[192] Brownlie, *A survey of customary law rules for the protection of the environment*, (L.A. Teclaff and A. E. Utton ed., International Environmental Law 1974), p. 1.
[193] *Nuclear Test* 1995 I.C.J. 288.
[194] *Nuclear Test* 1995 I.C.J. 288, 289: " [...] "the immediate circumstance giving rise to the present phase of the Case is a decision announced by France in a media statement of 13 June 1995" by the President of the French Republic, according to which "France would conduct a final series of eight nuclear weapons tests in the South Pacific starting in September 1995." "

attributed to Frech acts.[195] Similarly, according to principle 21 of the UN Conference on the Human Environment: "States have in accordance with the Chapter of the United Nations and the principles of international law [...] the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction."[196] Although these examples relate to environmental law, they confirm the existence of an international principle of responsibility of States for damage caused to third States, and a principle which may be perfectly applicable to other branches of law, including Space Law, even in cases where a space activity is not considered a hazardous one.

Concluding, once a causal link has been established between a licit activity and damage to another State, the Claimant State should demonstrate the breach of a principle of law, *e.g.*, the duty of care or the duty to warn. As we discussed above, a breach of the duty of care or the duty to warn, could be considered a wrongful omission, which may carry all the legal consequences that were discussed in Section 1.5 above, even when the State activity that resulted in damage falls within the sovereignty rights of the State.

b) States may be also held responsible and liable for damage arising from hazardous activities. Mr. Barboza, Special Rapporteur in 1985 for the Working Group established by the ILC in 1978 for the study of International Liability for non-prohibited acts,[197] notified the ILC that "one of the most fundamental principles in international law, namely, that when a State uses its own advantages or resources it should at the same time take care not to hurt the resources of others", and that "the innocent victims of an activity that entails some danger should not be left to bear their loss, even if the actor conduct is without taint or wrongfulness."[198] Under international law, the performance of a hazardous activity by a State, such as space or nuclear energy ventures, usually bears strict liability. The

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[195] Nevertheless the Court in *Nuclear Test* 1995 I.C.J. 288, 342, affirms that "Where a party complains to the Court of possible environmental damage of an irreversible nature which another party is committing or threatening to commit, the proof or disproof of the matter alleged may present difficulty to the claimant as the necessary information may largely be in the hands of the party causing or threatening the damage."
[196] See Okowa *supra* 191, p. 69.
[197] B.A. Hurwitz, *State Liability for Outer Space Activities in accordance with the 1972 Convention on International Liability for Damage caused by Space Objects;* Utrecht Studies in Air and Space Law, (Drodrecht / Boston / London: Martinus Nijhoff Publishers, 1992) , p. 146.
[198] See Hurwitz, *ibid,* p. 149, quoting Mr. Barboza.

reasons for strict liability are the high risk of those activities and the usually serious consequences that an accident or failure may entail. What's more, in most domestic laws damage caused by a hazardous activity carry strict liability.[199] From an international law perspective that is also the case for nuclear,[200] aviation[201] and space[202] activities. In November 2001 the International Law Commission presented Draft Articles on the Prevention of Transboundary Harm from Hazardous Activities.[203] Although these Articles seem to focus on environmental issues, some of their provisions indicate tendencies in general international law. It is worthwhile to note that the preamble to the Draft Articles declares that the "freedom of States to carry on or permit activities in their territory or otherwise under their jurisdiction is not unlimited."[204] Draft Article 2 defines "harm" as the damage caused "to persons, property or the environment."[205] Additionally Draft Article 17 provides that the State of origin, that is, the State in whose territory or under whose jurisdiction or control occur the licit activities that cause transboundary harm, shall "without delay and by the most expeditious means, at its disposal, notify the State likely to be affected of an emergency [...] and provide it with all relevant and available

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[199] Canadian Hazardous Products Act (R.S. 1985, c. H-3), Section 28: "(1) Every person who contravenes or fails to comply with any provision of this Act or of any regulation made under this Act: (*a*) is guilty of an offence punishable on summary conviction and liable [...]" and section 29 "(1) No exception, exemption, excuse or qualification prescribed by law is required to be set out or negative, as the case may be, in an information or indictment for an offence under section 28 of this Act [...]" "(2) 2) In any prosecution for an offence mentioned in subsection (1), the burden of proving that an exception, exemption, excuse or qualification prescribed by law operates in favour of the accused is on the accused [...]" Online available at <http://laws.justice.gc.ca/en/H-3/> Updated to August 31, 2001 (Date accessed 06/06/2002).

[200] Paris Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 and Vienna Convention on Civil Liability for Nuclear Damage of 1963 online at the IAEA website at <http://www.iaea.or.at/worldatom/Documents/Infcircs/1996/inf500.shtml> and 1997 Protocol to the Vienna Convention of 1963 imposing strict liability Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage online at the International Atomic Energy Association website <http://www.iaea.or.at/worldatom/Documents/Legal/protamend.shtml> (Date accessed 06/06/2002).

[201] Convention for the Unification of Certain Rules Relating to International Carriage by Air of 1929 [Hereinafter Warsaw Convention and successive protocols] Ann. Air & Sp. L. 1993 XVIII- II, p. 325, (McGill University, 1993, Montreal, Canada) Information online available at the website of the Institute of Air & Space Law, McGill University <http://www.iasl.mcgill.ca/airlaw/private/warsaw/warsaw1929.pdf> (Date accessed 06/06/2002). Also see Convention for the Unification of Certain Rules for International Carriage by Air done at Montreal 1999. Online available at IATA http://www.iata.org/legal/_files/Montreal1999.doc (Date accessed 06/06/2002).

[202] See Liability Convention 1972; Article II: "A launching state shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight." *Supra* 228; Also see Outer Space Treaty 1967, Article VII: "Each Party to the Treaty that launches [...] an object in outer space [...] is international liable for damage to another State Party [...]."*supra* 213.

[203] See ILC Draft Articles on Hazardous Activities; *Supra* 159.

[204] See ILC Draft Articles on Hazardous Activities, Preamble; *Supra* 159.

[205] See ILC Draft Articles on Hazardous Activities, *ibid.*

information."[206] Unfortunately these draft Articles do not offer any provision related to liability issues; there is only a provision in Draft Article 19 that establishes means for settlement of disputes.[207] As Judge de Castro affirmed in the 1974 *Nuclear Test* cases "the principle of *sic utere tuo ut aliaenum non laedas* (one must not use its own property in such a way that injures another's) is a feature of law."[208]

In the same manner, by way of analogy,[209] it is possible to study and establish a parallelism between nuclear law and space law. The principles applying to responsibility and liability for the former may also be considered for space activities. Nuclear-powered activities are among the most hazardous activities, for quite obvious reasons. In the event of the Cosmos 954 accident,[210] which involved a nuclear-powered satellite, the Canadian Government, when presenting its claim to the Soviet Union, noted in section *(b)* of the claim under the title "General Principles of International Law" that the principle of absolute liability "is considered to have become a general principle of law [...] applied to the fields of activities having in common a high degree of risk."[211]

For the subject of our concern here, that is, the case of a GNSS satellite or signal malfunctioning resulting in damage, doubts may arise. First of all, there would be a need to differentiate between direct and indirect damages. This damages issue will be analyzed in depth under the section herein devoted to the Liability Convention of 1972, but in a few words, one can say that direct damage is that caused by an action or omission without intermediation, while an indirect one is "that for which the line of causation has been

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[206] See ILC Draft Articles on Hazardous Activities, Article 17; *Supra* 159.
[207] See ILC Draft Articles on Hazardous Activities, Article 1; *Supra* 159.
[208] *Nuclear Test* cases 1974, *supra* 111.
[209] Blanchette, I., & Dunbar, K. How Analogies are generated: The Roles of Structural and Superficial Similarity. *Memory & Cognition*, 28, 108-124. (2000): "Analogy is a basic human reasoning process used in science, literature, art, education, and politics. Analogy can be used to make predictions, provide explanations, and restructure our knowledge [...] Most researchers distinguish between two main components of an analogy -- the *Source* and the *Target*. The Source is the piece of knowledge that one is familiar with. The Target is usually the less familiar piece of knowledge. When one makes an analogy, one *Maps* features of the Source onto the Target." Information available online at the website of the University of McGill http://www.psych.mcgill.ca/perpg/fac/dunbar/analogy.html (date accessed 06/06/2002)
[210] See Bockstiegel & Benko, "Desintegration of Cosmos 954 over Canadian Territory in 1978: Canadian Department of External Affairs, Communique No. 27 on the Settlement of a Claim, and the Protocol between the Government of Canada and the Government of the USSR of April 2nd 1981" Vol. 1 A.VI.2, see *supra* 8; Also see Hurwitz, *supra* 197, p. 113 *et seq*. Cosmos 954 satellite re-entered the atmosphere on January the 28th 1978 scattering about 65 kilograms of radioactive material on some parts of Canada.
[211] See Hurwitz, *supra* 197, p. 120

interrupted, so it is not direct."[212] Therefore a proximate cause will determine whether damage is direct or not. Once the cause and effect are established, strict liability would arise from hazardous activities resulting in damage. Referring to a GNSS signals failure, it may seem less probable to see direct damage resulting in injury or death, but it is not so bizarre to think of a vast economic lost as a direct consequence of a malfunction of GNSS signals or satellite. Nevertheless both cases are possible and only an investigation of causation is able to determine whether it was the malfunctioning satellite or the signal that caused the damage. In addition, because of the fact that space activities are considered hazardous ones, strict liability should apply in the case of damages, being the causal nexus that determines the relation object-damage, with the burden of proof falling on the side of the GNSS provider.

3. *The Outer Space Treaty of 1967*[213]

Existing principles of general international law and of international customary law prior to the advent of space law are applicable to space law. Nevertheless, we will refer to space law as the branch of law that officially started[214] with the dawn of the space era in 1957.[215] In the context of the Cold War, and aware of the possibilities and advantages to which space superiority could lead, the two main players of the international community realized the need to achieve an international legal framework.

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[212] See Kayser, *supra* 76, p. 48.

[213] The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies [Hereinafter the Outer Space Treaty 1967], adopted by the General Assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967, 96 ratifications and 27 signatures (as of 1 February 2001); 18 U.S.T. 2410; TIAS 6347; 610 UNTS 205; Ann. Air & Sp. L. 1993 XVIII-II, p. 617, (McGill University 1993 Montreal, Canada) Online available at <http://www.oosa.unvienna.org/SpaceLaw/outersptxt.html> (Date accessed 03/06/2002).

[214] V. Kopal, *Evolution of the doctrine of Space Law* Space *Law, Development and Scope* (Westport, Connecticut, London: International Institute of Space Law, 1992), p. 17-32, for previous references and doctrines.

[215] Sputnik satellite was launched on October the 4th 1957. For more information about Sputnik, visit the NASA website at <http://history.nasa.gov/sputnik/> (Date accessed 14/06/2002).

In the following paragraphs, the history,[216] purpose and liability aspects of the Outer Space Treaty will be briefly analyzed in relation to GNSS.

The evolution of Space Law began in 1958 under the auspices of the United Nations, with the establishment of the Committee on the Peaceful Uses of Outer Space by the UN General Assembly.[217]

The UN General Assembly Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space[218] was the first major step taken toward a fundamental regulation of space activities,[219] and it set the basis for the "*Magna Carta* of international space law".[220] The Outer Space Treaty establishes the legal basis of space law and some of its provisions are recognized to have an *erga omnes* character.[221] In this sense, special consideration should be given to the principles of freedom of exploration of outer space, the non-appropriation principle, and the peaceful uses of outer space.[222]

Now, it is also important to establish the difference between responsibility and liability. As indicated by Professor Bin Cheng,

> Responsibility means essentially answerability, answerability for one's acts and omissions, for their being in conformity with whichever system of norms, whether moral, legal, religious, political or any other, which may be applicable, as well as answerability for their consequences, whether beneficial or injurious. In law, it applies

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[216] C. Q. Christol, *Space Law: Past, present and future*; (Deventer, The Netherlands; Boston: Kluwer Law and Taxation Publishers 1991), p. 212 to 215.

[217] N. Jasentuliyana, *The Lawmaking process in the United Nations*; Space Law, Development and Scope (Wesport, Connecticut, London N. Jasentuliyana, International Institute of Space Law, 1992) p. 33. Also see UN Resolution 1472 (XIV) 1959 establishing the UN Committe for the Peaceful Usus of Outer Space, *infra* 238.

[218] General Assembly Resolution 1962 (XVIII) 24th December 1963; A/RES/1962 (XVIII) 18th Session.

[219] S. Gorove, *Sources and Principles of Space Law*; Space Law, Development and Scope (Wesport, Connecticut, London: International Institute of Space Law, 1992), p. 46.

[220] See Gorove *ibid.*

[221] See Vienna Convention 1969, Article 34; *supra* 106.

[222] See Outer Space Treaty 1967, Article I: " [...] Outer space [...] shall be free for exploration and use by all States [...] in accordance with international law [...]" Article II " Outer space [...] is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." Article III " States [...] shall carry on activities in the exploration and use of outer space [...] in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security [...]" Article IV " not to place in orbit around the Earth any objects carrying nuclear weapons or any other kind of weapons of mass destruction [...]"*Supra* 213.

> in particular to a person's answerability for compliance with his or hers legal duties, and for any breaches thereof [...] Liability is often used specifically to denote the obligation to bear the consequences of a breach of a legal duty, in particular the obligation to make reparation for any damage caused, especially in the form of monetary payment [...][223]

In another definition, liability is referred to as "the accountability of a person or entity for damage caused to another person or entity as defined and regulated by a particular set of rules and principles."[224] In my opinion, a State's proper responsibility should necessarily imply a State's capability to compensate for its acts. That is, a well-performed responsibility cannot be understood without an established liability regime. Therefore, no distinction should be made between responsibility and liability, as one cannot be completely understood and properly performed without the other.

With respect to responsibility, the Outer Space Treaty provides a general, though significant, rule in its Article VI,

> *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 activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require *authorization and continuing supervision* by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.[225]

If we look at the definition provided by Professor Cheng about responsibility, and then look at Article VI of the Outer Space Treaty, we can easily see that the concept of responsibility set out in the Treaty is the one studied earlier in Section 2 under customary

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[223] B. Cheng, "Article VI of the 1967 Space Treaty Revisited: 'International Responsibility', 'National Activities', and ' The Appropriate State' " (1998) Vol. 26 No. 1, Journal of Space Law, 7, p. 9 and 10; Also see J. Huang "Development of the long-term legal framework for GNSS" Ann. Air & Sp. L. 1997 Vol. XXII-I, p. 594, commenting on the ICAO panel of legal and technical experts (LETP) for GNSS created in 1995. (McGill University 1997 Montreal, Canada).

[224] See Andries, *supra* 73, p. 63, quoting the WG1 Paper 3 Definition of the requirements for a liability system for GNSS-2, June 28th 1999 European Commission at 1.2.

[225] See Outer Space Treaty 1967, Article VI [Emphasis added] *Supra* 213.

law, but with the force of treaty law. Apart from this, the Outer Space Treaty does not provide for any kind upon breach of this international responsibility, so recourse to international law as described in Sect. 2 is advisable. Let us remember that one of the consequences under international responsibility for breach of obligations may be, among others, monetary compensation. Therefore, and as an example, denying compensation for damage caused as provided in Article VII below would bring the liable State to fall under the responsibility provision of Article VI with all the legal consequences that that would imply.

A general liability regime is established in Article VII:

> Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, *is internationally liable for damage* to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies.[226]

It is important to note that, although this provision is further developed under the Liability Convention of 1972, it establishes the applicable rule for relations between States not parties to both treaties. It also seems likely to rule the relationship between a State party and a non-party, as well as between non-parties since the Treaty, or at least its most important provisions, seem to have attained the status of customary law,[227] through States' practice, acceptance and recognition.

Again the question of direct and indirect damages remains open, as no definition of damage or of space objects is provided to us in the Outer Space Treaty. Nevertheless, as we have considered before, causation will determine whether damage is direct or not, and this will be established on a case-by-case basis by each court.

A different issue is what should be understood to mean 'recoverable damages'. The Treaty does not say a word about this, so it seems that indirect damage, as usually is the case under international law, would not be covered if defined as a regular activity, but

[226] See Outer Space Treaty 1967, Article VII; *supra* 213.
[227] See Kayser, *supra* 76, p. 35.

rather it would fall under the scope of the Treaty if the activity concerned is considered a hazardous one.

In conclusion, and with respect to GNSS, the terms of the Outer Space Treaty should cover the GNSS primary signal provider, no matter whether we are dealing with a State, an international organization, a State agency, or a private entity. Any satellite or signal failure directly causing damage to another entity should fall under the scope of applicability of the Treaty and therefore the GNSS provider should be held liable. Were a State to reject such liability for damage caused by itself or any of its entities –either public or private- it would then fall under Article VI, so it would be held internationally responsible. This international responsibility would arise from a breach of obligations under treaty law.

4. *The Liability Convention of 1972 and GNSS*[228]

Before beginning to analyse the Liability Convention, a couple of practical questions should be posed. The first one is as follows: what is the difference, in terms of damage, between a bank being hit by a piece of a satellite on a Sunday afternoon, and the same bank failing to receive proper GPS or GLONASS timing for its bank transactions on a Monday morning, both causing a considerable extent of monetary loss? (The answer is not that one day is Sunday, and the other is Monday.)

A second question, similar to the first one, is the following: what is the difference between a satellite being hit in outer space by an identifiable piece of debris causing irreparable damage and the subsequent loss of the satellite, and the same satellite, using GNSS positioning and timing for its orbital adjustments and for the proper functioning of

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[228] The Convention on International Liability for Damage Caused by Space Objects [Hereinafter the Liability Convention] adopted by the UN General Assembly in its resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on the 1st September 1972, 81 ratifications and 26 signatures(as of 1 February 2001). ESA and EUTELSAT have also accepted rights and obligations. 24 UST 2389; TIAS 7762; 961 UNTS 187; Ann. Air & Sp. L. 1993 XVIII- II, p. 653(McGill University, 1993 Montreal, Canada) ; online available at <http://www.oosa.unvienna.org/SpaceLaw/liabilitytxt.html> (Date accessed 02/06/2002).

its on-board equipment, receiving a faulty signal resulting in, *e.g.*, loss of altitude or malfunctioning of the on-board instruments, shortening or destroying the planned useful life or mission of the satellite?

The Liability Convention is in full effect with 81 States Parties and 20 signatures.[229] Additional evidence of its strength is the fact that it rules the liability issues of one of the most important space projects ever, the International Space Station, which recognizes in Article 17 of its Intergovernmental Agreement of 1998, the applicability of the Convention to the construction of the ISS.[230]

But in talking about GNSS satellite or signals malfunctions causing damage, it can be affirmed without much risk of error that the Convention is virtually dead. Neither the Russian Federation[231] nor the United States,[232] owners of the two GNSS operating systems, consider damage cause by a failure in the GNSS signals to fall under the scope of the Liability Convention of 1972. Therefore, they do not accept international liability in such cases.[233] A different issue is, or should be, the matter of responsibility (as a breach of the duty to warn or of a duty of care) resulting from damage to third countries, which would make a State held responsible –and eventually liable-. Therefore, a failure to warn of an error on the signal causing damage could fall under general customary law if not under Article VI of the Outer Space Treaty.[234]

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[229] See Liability Convention 1972; *supra* 228.

[230] Agreement Among the Government of Canada, the Goverments of the ESA Member States, the Goverments of Japan, the Russian Federation, and the USA Concerning Cooperation on the Civil International Space Station [Hereinafter ISS IGA]. Article 17. "Liability Convention: (1) except as otherwise provided in Article 16 [cross-waiver of liability among States parties to the IGA], the Partner States, as well as ESA, shall remain liable in accordance with the Liability Convention [...]" Law of Space Applications (Air and Space Law Applications) Documents and materials. Volume II (Professor Ram S. Jakhu IASL, McGill University, Montreal, Canada September 2001) at 185; The agreement is available online at the Japanese Space Agency (NASDA) website <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-2-2-16/index_e.html> (Date accessed 09/06/2002).

[231] See Kuriamov, *supra* 50.

[232] P. A. Salin, "An update on GNSS before the next ICAO experts meeting on the legal and technical aspects of the future satellite air navigation systems", Ann. Air & Sp. L. 1997 Vol. XXII-I, p. 517 (McGill University, 1997, Montreal, Canada).

[233] See W. F. Price, *supra* 17: Nevertheless "the US could accept liability in certain cases." From a Public International Law perspective, as the US does not seem to recognize the applicability of the OST nor the Liability Convention to damage caused by failure in the GPS signal, an *ex gratia* compensation seems the correct interpretation for this acceptance of liability, despite the domestic regimes available that will be later analyzed.

[234] See Outer Space Treaty 1967, Article VI, *supra* 225.

Before entering into the study of the Convention, I would like to mention that the following analysis will not deal with damage caused by a direct hit or collision of a GNSS satellite with other space objects, aircraft in flight or on the surface of the Earth. There is no doubt that such accidents will fall under the scope of Articles II and III of the Liability Convention.[235]

4.1 *History and Purpose of the Liability Convention of 1972.*

The history of the Convention begins in 1958 with the establishment of an *ad hoc* Committee on the Peaceful Uses of Outer Space through the United Nations General Assembly Resolution 1348 (XIII).[236] The problem of liability for injury caused by space vehicles was one of the "legal problems susceptible of priority treatment" under the Report[237] presented by the Legal Committee established under the *ad hoc* Committee on the Peaceful Uses of Outer Space.

Later, in 1959, UNCOPUOS was created by UNGA Resolution 1472 (XIV) 1959,[238] and in 1962 its Legal Subcommittee was set up. At its first session, the U.S. introduced two basic guiding principles for the establishment of a study-group on liability: The first principle proposed that "the liability of the launching state or organization should be absolute" and the second that liability "should attach whether injury or damage occurred on land, on the sea or in the air."[239]

Another UNGA Resolution in 1962 urged the Committee to continue its work on, among other topics, liability.[240] The first draft treaty was provided by the Belgian Delegation at the 25th Meeting of the Sub-Committee, in 1963,[241] and this draft dealt

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[235] See Liability Convention 1972, arts. II and III; *supra* 228.
[236] United Nations General Assembly Resolution [Hereinafter UNGA Resolution] 1348 (XIII) of 1958 online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_13_1348.html> (Date accessed 14/06/2002).
[237] UN Doc. A/4141 (14 July 1959), p. 4 and 63.
[238] UN Resolution 1472 (XIV) 1959 establishing the UN Committe for the Peaceful Usus of Outer Space [Hereinafter UNCOPUOS]; Online available at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_14_1472.html> (Date accessed 09/06/2002).
[239] Summary Records A/AC.105/c.2/SR.1, p. 9.
[240] UN Resolution 1802 (XVII) of December 11th 1962, online available at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_17_1802.html> (Date accessed 09/06/2002).
[241] Summary Records A/AC.105/c.2/L. 7, Report 12, I, 10, introd. SR. 25.

more with general principles. After this second session, it was agreed that these principles should take the form of a Declaration. Therefore, in 1963, principle number 8 of UNGA Resolution 1962 (XVIII), on the Declaration of Principles Governing the Activities of States in the Exploration and Use of Outer Space, referred to international liability.[242] Later that same year, again the UN General Assembly requested the Committee to "arrange for the prompt preparation of international agreements on liability for damage caused by objects launched into outer space [...]".[243] As a result, two working groups were established, one dealing with liability and the other with assistance and return of astronauts and space objects, as requested by the General Assembly.

Following to the 4th session of the Sub-Committee another resolution was adopted, in 1965, which encouraged the Sub-Committee to keep working on the liability and rescue matters.[244] In 1966, as an initiative of the U.S. and USSR, the legal Sub-Committee started work on an international agreement that would lead to the drafting and finalization of the Outer Space Treaty of 1967.[245]

Further resolutions, urgently asking the Committee to elaborate agreements on liability and on assistance and return of astronauts and space vehicles, were adopted in 1966[246] and 1967.[247] This lead to the Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects launched into Outer Space.[248] Many other States regarded this Rescue Agreement as a treaty that clearly favoured the rights of the space powers, by imposing some obligations on the rest of the world without covering them for

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[242] A/RES/ 1962 (XVIII), Principle 5: "Each state which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched, is internationally liable for damage to a foreign State or its natural or juridical persons by such object or its component parts on the earth, in air space, or in outer space." *Supra* 218.

[243] UNGA Resolution 1963 (XVIII) of 1963, information online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_18_1963.html> (Date accessed 09/06/2002).

[244] UNGA Resolution 2130 (XX) of 21st December 1965, online available at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_20_2130.html> (Date accessed 09/06/2002).

[245] See Outer Space Treaty, *supra* 213.

[246] UNGA Resolution 2222 (XXI) of 19th December 1966 - Online available at the UN Office for Outer Space Activities <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_21_2222.html> (Date accessed 09/06/2002).

[247] UNGA Resolution 2260 (XXII) of the 6th November 1967, A/RES/2260 (XXII) General Assembly 22nd Session.

[248] The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space [the Rescue Agreement], opened for signature on 22 April 1968, entered into force on 3 December 1968, 87 ratifications and 26 signatures (as of 1 February 2001) online available at <http://www.oosa.unvienna.org/SpaceLaw/rescuetxt.htm> (Date accessed 09/06/2002).

possible damage caused by space objects.[249] Under pressure from such States, the General Assembly urgently called for the conclusion of a draft Liability Convention, in its Resolutions 2345 (XXII) of December the 19th of 1967,[250] Resolution 2453B (XXIII) of 1968,[251] 2601B (XXIV) of 1969[252] and 2733B (XXV) of 1970:

> *Urges* the Committee on the Peaceful Uses of Outer Space to make a decisive effort to reach early agreement on texts embodying the principles outlined in paragraph 5 above with a view to submitting a draft convention on liability to the General Assembly at its twenty-sixth session. [253]

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[249] UN Doc. Summary Records. A/AC.105/c.2/SR86 at 10, 12, and 14. Mr. Otsuka (Japan) said that "it had held all along that a rescue and return agreement should be formulated in conjuction with a liability agreement, since the two were interconnected from the legal and practical point of view." Also see p. 12 Mr. Rao (India): " [...] an agreement on liability was also vitally important [...]"and see p. 14, Mr. Silva (Brazil) " The two agreements were logically interrelated and together provided the essential balance of rights and duties of space and non-space powers."

[250] UNGA Resolution 2345 (XXII) 1967 that "(4) *Calls upon* the Committee on the Peaceful Uses of Outer Space to complete urgently the preparation of the draft agreement on liability for damage caused by the launching of objects into outer space and, in any event, not later than the beginning of the twenty-third session of the General Assembly, and to submit it to the Assembly at that session." Online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_22_2345.html> (date accessed 09/06/2002).

[251] UNGA Resolution 2453B (XXIII) of 1968, "(2) *Requests* the Committee on the Peaceful Uses of Outer Space: (a) To complete urgently the preparation of a draft agreement on liability for damage caused by the launching of objects into outer space and to submit it to the General Assembly at its twenty-fourth session [...]" Online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_23_2453.html> (Date accessed 09/06/2002).

[252] UNGA Resolution 2601B (XXIV) of 1969, "*Noting* that various proposals have been submitted to the Committee on the Peaceful Uses of Outer Space and that a considerable number of provisions have been agreed upon in its Legal Sub-Committee, 1.*Regrets* that the Committee on the Peaceful Uses of Outer Space has not yet been able to complete the drafting of a liability convention, a task assigned to it by the General Assembly during the last six years; 2. *Takes note with appreciation* of the efforts made by the Committee on the Peaceful Uses of Outer Space at its twelfth session to complete the preparation of this draft with a view to its submission to the General Assembly at its twenty-fourth session; 3. *Notes* that a certain *rapprochement* of views was achieved in the negotiations on the draft convention on liability in 1969; 4. *Expresses its deep dissatisfaction* that efforts to complete the convention have not been successful and, at the same time, urges the Committee on the Peaceful Uses of Outer Space to complete the draft convention on liability in time for final consideration by the General Assembly during its twenty-fifth session; 5. *Emphasizes* that the convention is intended to establish international rules and procedures concerning liability for damage caused by the launching of objects into outer space and to ensure, in particular, prompt and equitable compensation for damage." Online available at the UN Office for Outer Space Activities at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_24_2601.html> (Date accessed 09/06/2002).

[253] UNGA Resolution 2733B (XXV) of 1970, "*Recalling* [...] that the convention was intended to establish international rules and procedures concerning liability for damage caused by the launching of objects into outer space and to ensure, in particular, prompt and equitable compensation for damage.
Affirming that until an effective convention is concluded an unsatisfactory situation will exist in which the remedies for damage caused by space objects are inadequate for the needs of the nations and peoples of the world, *Aware* that various proposals have been submitted to the Committee on the Peaceful Uses of Outer Space and that a number of provisions have been agreed upon, although subject to certain conditions and reservations, in its Legal Sub-Committee, 1. *Takes note* of the efforts made by the Committee on the Peaceful Uses of Outer Space and its Legal Sub-Committee at their sessions in 1970 to complete the preparation of a draft convention on liability, for submission to the General Assembly at its current session; 2. *Expresses its deep regret* that, notwithstanding some progress towards this objective, the Committee on

Finally, in November 1971, the General Assembly adopted the final draft prepared by the Committee in a Resolution to which the Liability Convention is annexed,[254] and the Liability Convention finally entered into force on September the 1st 1972.

Now that the history of the Convention has been briefly explained, this section will now go a step further and analyze the purposes of the Liability Convention, which will be of the utmost importance for the topic subject of this thesis.

In order to study the purpose of the Liability Convention, this section will first analyze its Preamble as well as some of the *travaux préparatoires*.

The purposes of a Treaty can be deduced from its Preamble. Additional information, in case of doubt, may be also taken from the *travaux préparatoires*. Reference can also be made to previous agreements in the field, and to General Assembly Resolutions, which although they are not of binding nature, reflect the will of States to get closer to a desired behaviour and thus can commonly be taken as guidelines to follow.[255] These Resolutions may also lead to the formation of customary law, or might also crystallize into a posterior agreement.

The Preamble of a Treaty is the normal place where any statement of the object of the Treaty is generally embodied. In the case of the Liability Convention we find the spirit of the Convention, its purpose, in paragraphs 3 and 4 of the Preamble:

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the Peaceful Uses of Outer Space has not yet been able to complete the drafting of a convention on liability, a subject which it has had under consideration for the past seven years; 3. *Affirms* that the early conclusion of an effective and generally acceptable convention on liability should remain the firm priority task of the Committee on the Peaceful Uses of Outer Space and urges the Committee to intensify its efforts to reach agreement; 4. *Notes* in this connection that the main obstacle to agreement lies in differences of opinion within the Committee on the Peaceful uses of Outer Space on two main issues: the legal rules to be applied for determining compensation payable to the victims of damage and procedures for the settlement of claims; 5. *Expresses the view* that a condition of a satisfactory convention on liability is that it should contain provisions which would ensure the payment of a full measure of compensation to victims and effective procedures which would lead to the prompt and equitable settlement of claims; 6. *Urges* the Committee on the Peaceful Uses of Outer Space to make a decisive effort to reach early agreement on texts embodying the principles outlined in paragraph 5 above with a view to submitting a draft convention on liability to the General Assembly at its twenty-sixth session." Online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_25_2733.html> (Date accessed 09/06/2002).

[254] UNGA Resolution 2777 (XXVI) of 29th November 1971. Online available at <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_26_2777.html> (Date accessed 09/06/2002).

[255] UN Charter Chapter IV, *On the General Assembly*, and Article 13 on *Recommendations*, see *supra* 184.

> [...] Taking into consideration that, *notwithstanding the precautionary measures* to be taken by States and international intergovernmental organizations involved in the launching of space objects, damage may on occasion be caused by such objects,
> Recognizing the need to elaborate effective international rules and procedures concerning liability for damage caused by space objects and *to ensure, in particular, the prompt payment under the terms of this Convention of a full and equitable measure of compensation to victims of such damage* [...][256]

These two paragraphs have been widely accepted by the international community and by the majority of publicists as confirmation that the main purpose of the Liability Convention is the protection of the victims of damage. Prompt, full and equitable compensation must be ensured by the Convention if damage is caused, regardless of the precautionary measures taken by those States involved in space activities.

Supporting this view, we can have a look at the first draft of the United States that affirmed the need of establishing "a simple and expeditious procedure to provide financial protection against damage [....] Thus the international community would have some assurance that the Powers which were already engaged in outer space activities were ready to meet their responsibilities and to compensate injured persons."[257] It is clear how the US's will, in this case, is to protect the injured victim. The Austrian delegate also stated that there was a need "to ensure maximum protection for the possible victims. Any international instrument should avoid curtailing in any way the rights and legal remedies available to claimants; it should rather provide them with additional protection".[258] The drafts and statements made by other countries and delegates follow the same path:[259] "The main task of the Sub-Committee, as laid down in the General Assembly, was to work out a convention that would guarantee compensation for States or individuals who were victims of space activities in which they had taken no party";[260] "The desired goal

[256] See Liability Convention 1972, Preamble [Emphasis added]; *supra* 228.
[257] UN Doc. A/AC.105/c.2/ SR. 29-37, p. 26.
[258] UN Doc. A/AC.105/c.2/ SR 29-37, p. 38.
[259] P. van Fenema, *The 1972 Convention on International Liability for Damage caused by Space Objects,* (LL.M Thesis (1973) University of McGill, Montreal) commenting on Canada, Australia, Belgium, Hungary, p. 26, 27, 28.
[260] UN Doc. A/AC.105/c.2/SR 93, p. 45: Mr. Miller (Canada).

was to establish a simple and expeditious procedure governing financial compensation for damage suffered by persons not connected with space activities [...]".[261]

One of the most recognized Professors in the space law field, who also participated in the negotiations and in the drafting of the Liability Convention, Professor A. A. Cocca from Argentina, has confirmed the victim-oriented nature of the 1972 Liability Convention.[262] Some other publicists, such as Professor F. G. Von der Dunk,[263] B. A. Hutwitz,[264] V. Kayser,[265] B. D. K. Henaku,[266] or J. Hermida[267] are of the same opinion.

In addition, the preamble recalls the legislative basis on which the Convention rests, meaning the Outer Space Treaty of 1967 with all its provisions, which also refers to international law and the Charter of the United Nations.

As illustrated in Resolution 2601 (XXIV) of 1969, the purpose of the Liability Convention is "to establish international rules [...] concerning liability for damage caused by the launching of objects into space and to ensure, in particular, the prompt and equitable compensation for damage."[268] In similar manner, this victim-oriented character of the Convention is also reflected in the successive UNGA Resolutions preceding the final draft and the definitive version of the Liability Convention was adopted. As pointed out by Dr. van Fenema "[...] the operative clauses of the Convention should be read in

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[261] UN Doc. A/AC.105/c.2/ SR 77, p. 5: "The desired goal was to establish a simple and expeditious procedure governing financial compensation for damage suffered by persons not connected with space activities [...]".

[262] Professor Maria de las Mercedes Esquivel Cocca, Professor of Air & Space Law, on behalf of Professor A.A. Cocca. Information provided via e-mail on the 20th of May 2002. A copy of the e-mail, in original Spanish, is available upon request <rodriguezpablo@hotmail.com>.

[263] F. G. Von der Dunk "The 1972 Liability Convention, enhancing adherence and effective application" 1998 IISL/ECSL Symposium, The Review of the Status of the Outer Space Treaties, p. 366: "[...] the aims [...] should be for that reason be interpreted as broadly and generously as possible. This certainly applies to the Liability Convention of 1972." Nevertheless, Dr. Von der Dunk is skeptical about a failure on the signal of GNSS causing damage falling under the scope of the Convention. This was confirmed via e-mail on May the 13th 2002. Original e-mail available upon request to <rodriguezpablo@hotmail.com>.

[264] See Hurwitz, *supra* 197, p. 9.

[265] See Kayser, *supra* 76, p. 35 and 36.

[266] B. D. K. Henaku, "Expanding Global Navigation Services: Selected Legal Issues." Commentary Paper, Proceedings of the Workshop on Space Law in the 21st Century, UNISPACE III, Techincal Forum, July 1999, p. 174 *et seq.*

[267] J. Hermida, *Derecho Espacial Comercial, aspectos internacionales, nacionales y contractuales/Commercial Space Law, international, national and contractual aspects*, (Ediciones de Palma, Buenos Aires, Argentina - 1997), p. 283.

[268] UNGA Resolution 2601B (XXIV) 1969. See *supra* 252.

such a way that the victim receives complete justice. The interpretation of the provisions that follow should be as victim-oriented as possible."[269]

4.2 *Definitions under the Liability Convention: Concepts of 'Damage' and 'Caused by Its Space Object'.*

Article I, paragraph *a)* of the Convention defines the term "damage" as meaning "[...] loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations."[270]

As observed by Professor Cocca, and as also may be assumed from the simple reading of the wording of the Convention, "in Space Law there exists one of the widest concepts of 'damage' known."[271] Similarly J. Hermida affirms that the definition of damage under the Liability Convention is a broad one, which is in accordance with the negotiating history of the Convention.[272] (For instance, just to cite one example for comparison, Article 17 of the Warsaw Convention of 1929 defines the term 'damage' as that "sustained in the event of the death or wounding of a passenger or any other bodily injury suffered by a passenger [...].")[273] Professor Hurwitz also remarks that there is "nothing extraordinary about this definition [of damage under the Liability Convention], which is comparable to, for example, parallel definitions in nuclear energy conventions which were adopted a decade before the Liability Convention."[274] The term 'damage' is one of the most important terms defined by the Liability Convention, since, if there is no damage, there is no liability. Furthermore, it seems to be in the term 'damage' where States and publicists justify the non-applicability of the Liability Convention to damage caused by failure of the GNSS signal.

As we have seen, there is no need to resort to interpretation of a treaty if the text is clear. In my opinion, just from the reading of Article I in connection with Article II, there

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[269] See van Fenema, *supra* 259, p. 30.
[270] See Liability Convention 1972, Article I; *supra* 228.
[271] See Cocca, *supra* 262 – Unofficial translation.
[272] J. Hermida, *Space Risk and Management* (McGill University LL.M. Thesis 2000), p. 20 .
[273] See Warsaw Convention of 1929, *supra* 201.
[274] See Hurwitz *supra* 197, p. 13.

should be no doubt of the applicability of the Liability Convention to indirect damages. The sentence 'other impairment of health' is quite illustrative of this point. This is also quite clear if we read Article II in connection with Article XII, as well as within the scope and spirit of the Liability Convention; which recognizes that a State is "absolute liable to pay compensation for damage caused by its space objects"[275] so that it "will restore the person, natural or judicial, State or international organization [...] to the condition which would have existed if the damage had not occurred"[276] establishing "full and equitable measure of compensation".[277]

Also noteworthy is the fact that the Liability Convention in its Article X paragraph 3, final sentence, affirms that in the case of unknown damage "the claimant State shall be entitled to revise the claim and submit additional documentation after the expiration of such time-limits until one year after the full extent of the damage is known."[278] This also reveals the intention of the Convention to have indirect and remote damages covered under its scope.

Given all this evidence, I do not understand the polemics created about direct and indirect damages under the Liability Convention. From my point of view, it is quite evident that the Convention aims to have the victim restored to a position equivalent to no damage having occurred. Also in my opinion, there is no need even to consider the *travaux préparatoires,* as the text of the Convention seems to be clear. Nevertheless, as the majority of the publicist and the current GNSS Government providers do not agree with this interpretation, a brief referral will be made to some of the discussions and negotiations regarding the Liability Convention that expressly exclude the term "collision" from the drafting, as well as to the thoughts of some publicists who also support this reading.

The word 'collision' is the key issue when interpreting the phrase 'damage caused by its space objects". Even the U.S. was against the idea of collision, in the case

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[275] See Liability Convention 1972, Article II; *supra* 228.
[276] See Liability Convention 1972, Article XII: "The compensation which the launching State shall be liable to pay for damage under this Convention shall be determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred." *Supra* 228.
[277] See Liability Convention 1972, Preamble 4th paragraph; *supra* 228.
[278] See Liability Convention 1972, Article X paragraph 3; *supra* 228.

that it happens in outer space, as they considered that it was too early to think about such thing (that is, if the U.S. thought that the chance of a collision in outer space was insignificant, but then the U.S. still agreed to establish a liability regime, it means that the U.S. contemplated other possibilities of damage apart from collision).[279] Furthermore, at the 3rd session, the U.S. draft presented absolute liability for damage, and as an exception to this rule, excluded collisions of space objects, which can be interpreted *a sensu contrario* as the acceptance by the U.S. that damage other than the one resulting from a collision could be identifiable, measurable and within the scope of the Convention.[280] In addition, damage by collision was also excluded at the 6th session as damage could be caused "[...] during launching, transit or descent."[281]

Study of the discussions in the Sub-Committee supports the view that a wider scope of causation of damage was intended. Although the U.S. introduced later a proposal partially referring to 'collision' when referring to space-to-space damage, the delegates of France and Canada maintained that the word 'collision' as physical contact was too restrictive and would not cover damages caused by the proximity of a space object, and other Delegations also foresaw that collisions were not the only risks that should be born in mind as "[...] for instance, a communications satellite could be affected by radio-electric wave interference [so] The convention should make provision not only merely for damage which could be caused by the launching, transit or descent of a space object *but also for that arising from the functionning of such an object or from the activities on it.*"[282] In response to this discussion, the United States accepted the deletion of the word

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[279] UN Doc. A/AC.105/c.2/ SR 38, p. 6-7: "No mention was made of the possibility of an accidental collision between objects launched into space, since such a collision was extremely unlikely." UN Doc. A/AC.105/L.4 Report 6 at 6/7, and A/AC.105/L.5 Report 12, I at 6.

[280] UN Doc. A/AC.105/c.2/SR 38 at 6/7; See also US Proposal of 9th of March 1964, A/AC.105/c.2/L.8: Article II " [...] Including *any damage* caused by apparatus or equipment used in such launching." [Emphasis added] In similar terms, Revisions 2 of October 1964 and Revision 3 of 1965.

[281] UN Doc. A/AC.105/c.2/L. 19 (21/06/1967), p. 2: Article II: " [...] damage shown to have been caused by the launching , transit, or descent [...]"; See also UN Doc. A/AC.105/c.2/ SR 29-37, p. 85, Mr. Khlestov (USSR): "The question of liaiblity for damage was simple when an object was launched by one State by its own territory [...]; in such a case, the launching State alone was liable for *any* damage." [Emphasis added]; Also see UN Doc. A/AC.105/c.2/ SR 48, p. 10-11. Mr. Rybakov (USSR): "All activities in outer space [...] must be carried out in conformity with the principles of the Declaration [UNGA Res. 1962 (XVIII)] [...] all States involved in the launching of a space object were liable for *any damage* it caused." [Emphasis added].

[282] UN Doc. A/AC 105/c.2/SR 94 at 53 and 54: Mr. Miller (Canada): "[...] The use of the term "collision", which implied physical contact, might raise certain difficulties in respect of damage caused by one space object to another, or to a third party on the surface of the earth or elsewhere. In fact, the possibility of a collision between two space objects was fairly remote compared to other kind of damages, *such as*

'collision' and accepted the arguments of France and Canada.[283] Finally, Italy also made an important statement, affirming, "even damages occurring in outer space directly affected people living on the surface of the earth."[284]

Some publicists, such as Dr. van Fenema,[285] B.D. Kofi Henaku,[286] B.A. Hurwtiz,[287] and J. Hermida[288] have pointed out similar arguments and studies, and have reached the same conclusions. In addition, during the *travaux préparatoires,* Professor Cocca was of the opinion -and still is- that indirect damages should be covered. Thus the Liability Convention should embrace "*all* damage to health and property, as well as the consequences direct or indirect (immediate and mediate) and also the remote ones. This last 'remote damage' is due to the fact that in space activities there is a possibility of, among others, nuclear damages."[289]

But the fact that the word 'collision' was expressly excluded, and that the major space powers, including the actual providers of GNSS, accepted the fact that damage through means other than collisions should be covered by the Liability Convention, is not only a reality that appears in the negotiations of the Convention as well as in its text: Another manifestation is found in the **INTELSAT**[290] Agreement and in the INTELSAT

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interferences in the functioning of a communications satellite in orbit [...]" [Emphasis added]; Mr. Deleau (France): " Concerning to damage, mention had been made of the possibility of collisions, but [...] that was not the only risk to be taken into consideration: for instance, a communications satellite could be affected by radio-electric wave interference [...] The convention should make provision not only merely for damage which could be caused by the launching, transit or descent of a space object *but also for that arising from the functionning of such an object or from the activities on it.*" [Emphasis added].

[283] UN Doc. A/AC 105/c.2/ SR 95 at 66: Mr. Reis (USA): "In response to the objection raised by the Canadian representative to the word "collision', he [Mr. Reis] agreed to replace the beginning of the second paragraph by the expression "If space objects cause damage[...]" ".

[284] UN Doc. A/AC 105/c.2/ SR 93, Mr. Ambrosini (Italy), p. 45

[285] See van Fenema *supra* 259.

[286] B. D. K. Henaku "International Liability of the GNSS Space segment provider" Ann. Air & Sp. L. 1996 Vol. XXI-I, p. 143 *et. seq.* (McGill University 1996 Montreal, Canada).

[287] See Hurwitz *supra* 197.

[288] See Hermida *supra* 272, p. 20.

[289] See Cocca, *supra* 262 – Unofficial translation [Emphasis as in the original]; Also see A/AC.105/c.2/SR 49, p. 7: A. A. Cocca (Argentina): "Indirect damage and damage which might become apparent over an extended period of time would have to be taken into account."

[290]INTELSAT was founded as the world's first commercial satellite operator Formed in 1964 to provide global communications, Intelsat resulted from the Communications Satellite Act signed by U.S. President Kennedy in 1962. The International Telecommunications Satellite Organization was established on 12 February 1973 in accordance with the provisions of an Intergovernmental Agreement (Intelsat Agreement) and an Operating Agreement. Through its global system of 17 geostationary satellites and related ground segment facilities, Intelsat provides the capacity required for public telecommunications services to various customers in approximately 200 countries throughout the world. The parties to the INTELSAT Agreement were INTELSAT's 144 member countries. On July the 18th 2001 INTELSAT became a private corporation

Operating Agreement of 1973.[291] Article 18 of the Operating Agreement,[292] which deals with liability, affirms that the Governments parties agreed not to present a claim for liability among them or to the Organization "[...] for loss or damage sustained by reason of any unavailability, delay or faultiness of telecommunications services provided or to be provided [...]".[293] Although only the Outer Space Treaty is mentioned in the Preamble of the INTELSAT Agreement[294] and no reference is made to the Liability Convention, it is clear that the States parties to INTELSAT recognized that damage caused by failure in the service offered by INTELSAT is quantifiable and recoverable, and that is the reason why they agreed to limit their liability. Moreover, most of the States parties to INTELSAT were parties to the Liability Convention and to the Outer Space Treaty. In any case it is sufficient for this thesis that the U.S. and most European countries were a party to both, as if they have being recognizing for almost 30 years the liability to which they may incur for failure of the signal under the INTELSAT Agreement, they are implicitly recognizing that if they did not have agreed on such provision Member States would be held liable for those failures on the signal. As they were States parties to an International Organization, their relations fall under the scope of International Law, and for the case concerned, under the scope of the Outer Space Treaty of 1967 and the Liability Convention of 1972, which were already in force.[295] It is clear how States have been recognizing, though they do not mention it, that a failure of the INTELSAT service -which I insist is referred to as

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under US Law. Online information about INTELSAT available at <www.intelsat.com> (Date accessed 11/06/2002).

[291] INTELSAT Agreement and INTELSAT Operating Agreement Relating to the International Telecommunications Satellite Organization "INTELSAT". 23 U.S.T. 3813; T.I.A.S. (7532) 23 - 3813 (1971); Online available at <http://www.austlii.edu.au/au/other/dfat/treaties/1973/6.html> (Date accessed 11/06/2002).

[292] See INTELSAT Operating Agreement of 1973, Article 18 (Liability) (a) "*Neither INTELSAT nor any Signatory*, in its capacity as such, nor any director, officer or employee of any of them nor any representative to any organ of INTELSAT acting in the performance of their functions and within the scope of their authority, *shall be liable to, nor shall any claim be made against any of them by, any Signatory or INTELSAT for loss or damage sustained by reason of any unavailability, delay or faultiness of telecommunications services provided or to be provided* pursuant to the Agreement or this Operating Agreement." [Emphasis added] See *ibid.*

[293] See INTELSAT Operating Agreement of 1973, Article 18; *Ibid.*

[294] See INTELSAT Agreement, paragraph 2 of the Preamble "CONSIDERING the relevant provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies [...]" See *supra* 291.

[295] The Outer Space Treaty of 1967 entered into force the 10th of October 1967 and the Liability Convention on the 1st of September 1972, see *supra* 213 and *supra* 228 respectively. The INTELSAT Agreement and Operating Agreement entered into force on the 12th of February 1973, *supra* 291.

"unavailability, delay or faultiness of telecommunications services"- would fall under the terms of space law determining the liability in case of damage caused by these States.

But this is not the only evidence that we find in the INTELSAT *affair*. It is also vital to remark the fact that, among the services offered by INTELSAT and therefore subject to this waiver of liability -which it would have implied acceptance and recognition of liability if it had not been expressly excluded-, radio-navigation services can be found: these satellite radio-navigation services appear under the definitions set up in Article 1 paragraph *l)* of the INTELSAT Agreement, dealing with "specialized telecommunications services" that include "telecommunications services which can be provided by satellite, other than those defined in paragraph *(k)* of this Article, including, but not limited to, *radio navigation services* [...]".[296]

This clearly indicates, in my opinion, the definitive acceptance and recognition on the side of States of the applicability of the Liability Convention or the Outer Space Treaty to damage caused by a failure on GNSS signals. Although it could be argued that INTELSAT services have a cost for the users while GNSS services are provided free of direct users charge, this point is irrelevant in the sense of the Liability Convention or the Outer Space Treaty. Although it is not exactly the same case, we can see in the Vienna Convention of 1969 how a State "may not invoke the provisions of its internal law as justification for its failure to perform a treaty."[297] Nevertheless, the argument that a service is being offered free of direct charge does not justify the breach of an international obligation under any circumstances. In addition, it should not be forgotten that the INTELSAT Agreement and its Article 18 have been applied all along from 1973 to the year 2001. In my opinion, a clearer case in which recognition of the applicability of the Liability Convention to a GNSS signal failure will be difficult to find.[298]

Now that we have examined the term 'damage' and how the Liability Convention should cover both direct and indirect damages, we can affirm that the injured parties will only have to prove damage and causation. Despite my personal believe in the

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[296] See INTELSAT Agreement in Article 1.1), [Emphasis added], *supra* 291.
[297] See Vienna Convention 1969, art 27; *supra* 106.
[298] For dissenting opinions see: S. Gorove, *Developments in Space Law: Issues and Policies*; (Dordrecht: Mastinus Nijhoff, 1993), p. 151; S. Gorove "Some comments on the Convention on International Liability for Damage Caused by Space Objects" Proceedings of the 16th Colloquium on the Law of Outer Space (1973), p. 255; J. M. Epstein, "Global Positioning System: Defining the Legal Issues of its expanding Civil Use" Journal of Air Law and Commerce Vol. 61-1 (1995), p. 269; See Milde, *supra* 81, p. 212.

applicability of the Liability Convention to both types of damages, I would like to briefly analyze the difference between direct and indirect damages, just in case indirect damages would not fall under the Convention and for those who affirm that damage caused by a failure in the signals is an indirect damage. In my opinion, for these cases, the Liability Convention would still cover damage caused by a failure of the GNSS signal.

The difference between direct and indirect damage and the applicability of the Convention to both types of damage *is a matter of causation*. First it is important to note that neither 'causation' nor 'causal link' are defined in the Convention. Therefore, general theories of causation are applicable. Thus, a claimant will have to prove damage, and that the space object caused that damage. In the case of GNSS, the claimant would have to prove that damage was caused by a failure of the signal or the satellite, and show the causal connection.[299] As affirmed in the *Samoan Claims Award*, the damages for which a person is liable are those which are "both, in fact, caused by his action, and cannot be attributed to any other cause, and which a reasonable man in the position of the wrongdoer at the time would have foreseen as likely to ensue from his action."[300] Indirect damages are those where the line of causation has been interrupted, so it is not direct.[301]

From my point of view, it is an error to tie 'direct damage' with 'collision'. Damage is a result and not a means. "The word 'caused' should be interpreted as merely directing attention to the need for some causal connection between the accident and the damage, while leaving a broad discretion so that each claim can be determined on its

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[299] UN Doc. A/AC.105/c.2/SR 50, p. 10-11: Sir Kenneth Bailey (Australia): "All three draft proposals were based on the concept of cause and effect, although the Belgium text was perhaps the clearest and most explicit [...] It was agreed that the basic consideration was whether damage had occurred and whether it was a result of the launching of a space object [...]"; Also see A. Hingorani "US Sanctions on the Indo-Russian Rocket-Engine Deal. A subversion of the Missile Technology Control Regime" (1994) Casebook *Law of Space applications (Air and Space Law Applications)* Documents and Materials V. II (Compiled and edited by Ram S. Jakhu with the assistance of J. Hermida) Institute of Air & Space Law, McGill University, Montreal, Canada (September 2001), p. 294: During the Gulf War "more individuals died [...] from heart attack than from being hit by missiles." As we can see sometimes indirect and remote damage are even more harmful than direct ones. Another example of 'indirect damage' is the Union Carbide Plant catastrophe at Bhopal, India on December the 3rd 1984. Approximately results: 3,800 persons died, 40 persons experienced permanent total disability, and 2,680 persons experienced permanent partial disability. Source: Union Carbide Corporation website <http://www.bhopal.com/>; other sources cite 3000 killed and around 500,000 injured. Online at <www.greenpeace.org/pressreleases/toxics/1999nov29.html> "Over 5,000 people were killed immediately; the current death toll from exposure-related conditions is over 16,000" online at <http://www.earthrights.org/irtk/bhopal.html> (date accessed 11/06/2002).

[300] See Henaku, *supra* 286, p. 168/169.

[301] See Kayser, *supra* 76, p. 48.

merits and in the light of justice and equity."[302] "The term 'caused by' also can be interpreted in the context of causality, which means that there must be proximate causation between the damage and the activity from which the damage resulted [...]".[303]

Article II of the Liability Convention states 'caused by its space objects', and not caused by a *collision or hit* of its space objects. Generally the notion of proximate cause goes further than the simple link of causality; it also introduces the notion of proximity and foreseeability. These notions make the responsible person liable for those consequences reasonably foreseeable at the time he committed the act or omission.[304] General theories of causation declare that a direct damage will be the one caused by a proximate cause, which shall be finally determined by the courts.

The test that determines whether damage is the result of an action or omission is the test of proximate causation. As mentioned by Professor B. Cheng "if a loss is a normal consequence of an act, it is attributable to the act as a proximate cause. If a loss is not the normal and natural consequence of an act, it is not attributable to the act as a proximate cause."[305] As Professor Christol says, there "must be proximate causation between the damage and the activity from which the damage resulted",[306] and concludes that, because in the negotiations of the Liability Convention no conclusion was reached, the concept of 'cause' "should only require a causal connection between the accident and the damage."[307]

It is also important not only to determine causation from the perspective of proximate cause, but also from the perspective of foreseeability, as outer space activities are an example in which "unforeseen accidents" may be expected.[308] In the 1923 *US v Germany* Mixed Claims Commission, it was affirmed that "all indirect losses are covered [...] provided that there is a clear, unbroken connection between Germany's acts and the

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[302] See Kayser, *supra* 76, p. 48/49 quoting W. F. Foster.
[303] See Kayser, *ibid.*
[304] See Kayser, *supra* 76, p. 159.
[305] B. Cheng, *General Principles of Law as Applied by international Courts and Tribunals*, (London: Stevens - 1953), p. 246.
[306] See Christol, *supra* 216, p. 223.
[307] See Christol, *supra* 216, p. 223; Also see UN Doc. A/AC.105/c.2/L.7/Rev. 1 (1 October 1964), p. 1: liability will be absolute "[...] once proof has been given that there is a relationship of cause and effect between the damage, on the one hand, and the launching, motion, or descent [...] of the space device, on the other."
[308] See Kayser, *supra* 76, p. 153.

loss complained [...]".[309] And in the *Trail Smelter* case of 1938, it was affirmed that damage required compensation "[...] although the result be only proximate."[310] Professor Christol also observes that causation can be approached from two different perspectives: directness and proximate cause.[311] For the foresseability theory a standard is required, but as we have no standard, we will have to revert to a general theory of law, to the figure of a good *pater familias*[312] or a reasonable man. Normality and foreseeability are the objective and subjective sides of proximate causation.[313] The natural consequence will be determined by well-recognized standards, practices and authorities,[314] and in the end it will be the Tribunals that will determine the proximity of the causal connection. In the negotiations for the Liability Convention, a large number of the delegations agreed that it was better not to refer to 'indirect damage' in the Convention as this should "be considered in the light of relationship between cause and effect [...] if such a relationship were established, the term 'damage' would be sufficient under the proposed Convention without the need to discuss whether it was direct or indirect",[315] so clearly, indirect damages were seen as a matter of proximate or adequate causality that did not need to be expressed in the Convention.[316]

However, the U.S. does not take into account "remote or indirect damage for which there is only a hypothetical causal connection with a particular space activity."[317] Though the U.S. is free, of course, to interpret remote damage as not covered by the Convention, it must be remembered that the interpretation of treaties should not be left exclusively to the individual party State. Instead, in the case of doubt arising from the wording of a treaty, interpretation should be handed over to the proper *fora*.

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[309] See Hurwitz *supra* 197, p. 17.
[310] See Hurwitz, *ibid.*
[311] See Christol, *supra* 216, p. 223.
[312] L. Bond "The GNSS Safety and Sovereignty Convention of 2000 AD"; M. Milde, *Public International Air Law, Casebook and Materials*, (2001) McGill University, Montreal p. 140; Also see UN Doc. A/4141 (14 July 1959), p. 64 and 65: "It was pointed out, however, that no international standard regarding safety and precautionary measures governing the launching and control of space vehicles had yet benn formulated, and this fact could also be taken into account in studying analogies based on existing conventions."
[313] See Henaku *supra* 286, p. 168.
[314] See Henaku *ibid.*
[315] UN Doc. A/AC 105/L.61 & Corr. 1, Report 58, Annex II, 31.
[316] B. Cheng, *Studies in International Space Law*, p. 323 (Oxford: Clarendon Press, 1997).
[317] See B. Elder, *supra* 17, p. 899, quoting the US representative to the Legal-Subcommittee of COPUOS of June 30th 1971.

4.3 *Basis of Liability. Absolute Liability and Fault Liability.*

The bases for liability are established in the text of the Convention, more specifically in Articles II and III. Article II says,

> A launching State shall be *absolutely liable* to pay compensation *for damage caused by its space object on the surface of the earth or to aircraft flight* [...],

while Article III says that

> In the event of damage being caused *elsewhere than on the surface of the earth* to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable *only if the damage is due to its fault or the fault of persons for whom it is responsible.*[318]

In international law, as we have seen before, liability is usually based on fault or negligence. Strict liability is mainly found for those activities that are considered ultra hazardous. The reason for introducing absolute liability in the Convention is that "if a State chose to engage in a hazardous undertaking it must assume responsibility for all consequences [...]".[319] As pointed out by the Hague Academy of International Law's definition of ultra-hazardous, such activities do not imply a high degree of probability to materialize, "but rather that the consequences in the exceptional and perhaps quite improbable event of the hazard materializing may be so far-reaching that special rules concerning liability for such consequences are necessary [...]."[320] Furthermore, as mentioned by France in the 7th Session, "Justice requires that the burden of loss should be placed on the party best able to absorb it."[321]

Some arguments supporting this type of liability are, first, the fact that for space activities the proof of fault or negligence would be too difficult for the injured party, because both in a technical and a legal sense, space activities are in many cases considered as a matter of national security and they are classified as reserved information

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[318] See Liability Convention 1972, Articles II and III [Emphasis added]; *supra* 228.
[319] UN Doc. A/AC.105/c.2/SR 50, p. 6: Mr. Sohier (US): "If a State chose to engage in a hazardous undertaking it must assume responsability for all consequences [...]." Also See Kayser, *supra* 76, p. 50-51.
[320] Year Book of the International Law Commission 1983 Vol. I , p. 262 paragraph 23 (New York: A/CN.4/SER. A/1983 United Nations, 1984)
[321] See van Fenema, *supra* 259, p. 86 quoting Lay and Taubenfeld, p. 171, Prosser, p. 508 and Jenks, p. 289.

by many Governments.[322] Second, as there are no standards of care internationally established, reversion to the "reasonable man" theory would be necessary, with all its attendant difficulties.

Finally, absolute liability also means that liability may not be excluded nor softened by proof of best-efforts on the side of the offender. Only in the case of contributory negligence on the part of the injured party may liability be excluded. Article VI states that "gross negligence or from an act or omission done *with intent to cause damage* on the part of a claimant State or of natural or juridical persons it represents."[323] Therefore, other State's defences and immunities, as for example the so-called 'Act of God' or *force majeure* principle, will not waive liability under the Liability Convention.[324]

A definition of fault liability may be found in domestic law, in the case of *Donoghue v. Stevenson*, in which the Court states the following:

> [...] You must take reasonable care to avoid acts or omissions which you can reasonably foresee would be likely to injure your neighbour. Who, then, in law is my neighbour? The answer seems to be persons who are so closely and directly affected by my act that I ought reasonably to have them in contemplation as being so affected when I am directing my mind to the acts or omissions which are called into question.[325]

This acceptance of fault liability, only for space-to-space accidents, may also mean that those States damaged have accepted the risks implicit in their space activities,

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[322] The White House, Office of Science and Technology Policy, National Security Council, for immediate release, March 29, 1996 "US Policy Statement on the GPS", Ann. Air & Sp. L. 1997 Vol. XXII-II, p. 458 "...[we] will not conduct activities that preclude or deter commercial GPS activities, except for national security or public safety reasons." (McGill University (1997) Montreal, Canada); Also see *supra* 34.

[323] See Liability Convention 1972; Article VI Liability Convention: "1. Subject to the provisions of paragraph 2 of this Article, exoneration from absolute liability shall be granted to the extent that a launching State establishes that the damage has resulted either wholly or partially from gross negligence or from an act or omission done *with intent to cause damage* on the part of a claimant State or of natural or juridical persons it represents. 2. No exoneration whatever shall be granted in cases where the damage has resulted from activities conducted by a launching State which are not in conformity with international law including, in particular, the Charter of the United Nations and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies." [Emphasis added] *Supra* 228.

[324] UN Doc. A/AC.105/c.2/SR 48, p. 4. Mr. Sohier (US): "The rule of absolute liability should be unmistakably clear and simple and there should be no mitigation or exclusion for Acts of God."

[325] *Donoghue v. Stevenson,* L.J. Weber & L.L. I. Grossman, *Comparative Private Air Law, Selected cases readings, cases and materials*, Vol. I, Institute of Air & Space Law, McGill University (Fall 2001) Montreal, p. 365 paragraphs G-H.

so there is no need for absolute liability. As pointed out by Dr. van Fenema, this idea comes from maritime practice.[326]

4.4 *Entities Subject to Liability and Potential Claimants.*

Under the Liability Convention, States are the main drivers of space activities and the natural actors subject to liability, as well as the primary potential claimants. It is also remarkable to see how in the Liability Convention some of the major principles of international law have been expanded.

In this case, we can see how Articles VIII and IX have enlarged the principle of nationality.[327] The fact that diplomatic protection has been granted independent of the nationality of the subject is an innovation in international law, and strengthens the victim-oriented character of the Liability Convention. On the other hand, Article VII precludes such protection in case of the launching State's own nationals and foreign observers invited by the launching state.[328] Although nationals of the said State would still have recourse under their domestic courts, they would not be able to invoke the provisions of the Liability Convention against their own State (meaning, among other things, that the Liability Convention is not a self-executing treaty).

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[326] See van Fenema, *supra* 259, p. 91 and 92.

[327] See Liability Convention 1972; Article VIII: " 1. A State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation for such damage. 2. If the State of nationality has not presented a claim, another State may, in respect of damage sustained in its territory by any natural or juridical person, present a claim to a launching State. 3. If neither the State of nationality nor the State in whose territory the damage was sustained has presented a claim or notified its intention of presenting a claim, another State may, in respect of damage sustained by its permanent residents, present a claim to a launching State." And Article IX "A claim for compensation for damage shall be presented to a launching State through diplomatic channels. If a State does not maintain diplomatic relations with the launching State concerned, it may request another State to present its claim to that launching State or otherwise represent its interests under this Convention. It may also present its claim through the Secretary-General of the United Nations, provided the Claimant State and the launching State are both Members of the United Nations." *Supra* 228.

[328] See Liability Convention 1972; Article VII: "The provisions of this Convention shall not apply to damage caused by a space object of a launching State to:(a) nationals of that launching State; (b) foreign nationals during such time as they are participating in the operation of that space object from the time of its launching or at any stage thereafter until its descent, or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by that launching State." *Supra* 228.

An international organization may also be subject to the Liability Convention as provided in its Article XXII,[329] and may therefore be entitled to compensation for damage to its personnel and property, or be held liable within the term of "launching state" of Article I (currently, only ESA and EUTELSAT[330] have made a Declaration of Acceptance of Rights and Obligations to the Liability Convention[331]).

Finally, private entities are not directly subject to liability, nor may they raise a claim, under the Liability Convention. Nevertheless the Liability Convention is not an exclusive remedy, and it allows "a State or natural or juridical persons it might represent, [to pursue] a claim in the courts or administrative tribunals or agencies of a launching State."[332]

Despite this, the Convention does not permit the presentation of duplicate claims. It will be the State responsible for that private entity that will claim on behalf of its entity, or accept liability due to an accident involving its national entity.[333] For this second case and under national law, the State may recover the amount paid for the liability of its national entity as a result of its international obligations.

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[329] See Liability Convention 1972; Article XXII: "1). In this Convention, with the exception of Articles XXIV to XXVII, references to States shall be deemed to apply to any international intergovernmental organization which conducts space activities if the organization declares its acceptance of the rights and obligations provided for in this Convention and if a majority of the States members of the organization are States Parties to this Convention and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. 2). States members of any such organization which are States Parties to this Convention shall take all appropriate steps to ensure that the organization makes a declaration in accordance with the preceding paragraph. 3). If an international intergovernmental organization is liable for damage by virtue of the provisions of this Convention, that organization and those of its members which are States Parties to this Convention shall be jointly and severally liable; provided, however, that:(a) any claim for compensation in respect of such damage shall be first presented to the organization;(b) only where the organization has not paid, within a period of six months, any sum agreed or determined to be due as compensation for such damage, may the claimant State invoke the liability of the members which are States Parties to this Convention for the payment of that sum. 4). Any claim, pursuant to the provisions of this Convention, for compensation in respect of damage caused to an organization which has made a declaration in accordance with paragraph 1 of this Article shall be presented by a State member of the organization which is a State Party to this Convention." *Supra* 228.

[330] European Telecommunications Satellite Organization (EUTELSAT). Online information at <www.eutelsat.org> (Date accessed 12/06/2002).

[331] Available online at <http://www.oosa.unvienna.org/Reports/treaty_status_2001E.pdf> (last updated 1st January 2001) (Date accessed 12/06/2002).

[332] See Liability Convention 1972; Article XI, *supra* 228.

[333] See Liability Convention 1972; Articles VIII and XI, *supra* 228.

4.5 *Recoverable Damage, Claims Procedure and Settlement of Disputes.*

Recoverable damage is an issue that is quite connected to liability. For this reason, it will be briefly analyzed. The concept of recoverable damage is recognized in Article XII of the Convention,[334] which affirms that compensation shall be paid in accordance with international law and taking into consideration the principles of equity and justice, so as to restore the damaged party to the situation existing before damage. In the beginning there were different opinions about which damages should be recoverable. Hungary, on one side, was concerned about immaterial damages, as some socialist countries did not recognize those types of damages.[335] Finally, in 1971 the proposal formulated by Brazil, Hungary and Belgium was accepted, and it read almost exactly as the provision finally agreed upon in the Liability Convention.[336] These States had in mind the following consideration when drafting the proposal[337]: the ultimate Article should be victim-oriented, so the victim could restore, to the extent possible, to the *status quo ante* within the spirit of the General Assembly Resolution 2733B (XXV) of 1970.[338] It is worthnoting that the Italian delegation played an important role, as it actively convinced the U.S. to put forward the proposal.[339] It is quite obvious that restoring the victim to the *status quo ante* means compensating for mental damages, pain and suffering, etc., that is, damages that are usually considered as indirect damages. Therefore, it can be assumed that what almost all delegations intended at the end was to achieve complete reparation for any damage caused -typically called *restitutio ad integrum*- in contraposition to restoring to the *status quo ante.*[340] The difference is that the *restitutio ad integrum* remedy would also include other types of damages, *e.g.* loss of revenues, and usually is more complete than the concept of *status quo ante.*

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[334] See Liability Convention 1972; Article XII: "The compensation which the launching State shall be liable to pay for damage under this Convention shall be determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred." *Supra* 228.
[335] UN Doc. A/AC.105/c.2/SR 99, p. 8.
[336] See van Fenema, *supra* 259, p. 184 and 185.
[337] See van Fenema, *ibid.*
[338] See UNGA Resolution 2733B (XXV) of 1970 *supra* 253.
[339] See B. Cheng *supra* 316, p. 340.
[340] See B. Cheng *supra* 316, p. 335.

The claims procedures and settlement of disputes provisions of the Liability Convention are regulated in Articles IX, X, XI, and XIV to XIX. It is important to point out a couple of things: only States may raise claims under the scope of the Convention, and through diplomatic channels[341] within one, extensive, year[342]. Nevertheless, States or individuals may also present a claim under the domestic law of the launching state without invoking the Liability Convention. Duplication of claims is not permitted.[343] On the other hand, there is another exception to international law that constitutes an innovation of the Convention and that is also a reflection, once more, of its victim-oriented character, as claimants are not required to show "the prior exhaustion of any local remedies which may be available to a claimant State or to natural or juridical persons it represents."[344]

In the case of claims not solved through negotiations, the settlement of disputes procedures apply, so that "the parties concerned shall establish a Claims Commission at the request of either party"[345] within one year. Finally the "decision of the Commission shall be final and binding if the parties have so agreed", and the decision must, in any case, "state the reasons for its decision or award."[346]

Noteworthy on the subject of dispute resolution are the recent and opportune proposals of Mexico,[347] Austria and the ESA,[348] which suggest enhancing the strength of the Liability Convention by having the decisions of the Claims Commission become permanently binding, via a Declaration of Acceptance of the parties to it.

4.6 *Waivers of Liability and the Provisions of Article XXIII of the Liability Convention of 1972 on the light of the Vienna Convention of 1969.*

Article XXIII of the Liability Convention permits other agreements outside the Convention to reaffirm, supplement, or extend the provisions set forth in the Liability

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[341] See Liability Convention 1972; Article IX, *supra* 228.
[342] See Liability Convention 1972; Article X, *supra* 228.
[343] See Liability Convention 1972; Article XI, paragraph 2, *supra* 228.
[344] See Liability Convention 1972; Article XI, *supra* 228.
[345] See Liability Convention 1972; Article XIV, *supra* 228.
[346] See Liability Convention 1972; Article XIX, *supra* 228.
[347] UN Doc. A/AC.105/c.2/L.206 Rev. 1, 4th April 1997.
[348] See Aust, *supra* 150, p. 285 .

Convention.[349] If we read this Article as it should be read, that is, in good faith,[350] no subsuquent agreements limiting or waiving the liability of States that are parties to the Liability Convention should be permitted. In addition (although this is a personal view) paragraph 2 of Article XXIII seems to refer just to a *new agreement* with the purpose of "reaffirming, supplementing, or extending *its provisions*": that means, in my opinion, that the Liability Convention is referring to another agreement on the same subject matter: space liability. Furthermore, given that the Liability Convention is victim-oriented, as we have already seen, it does not seem logical to allow limitation of the scope of the Liability Convention, contravening the purpose for which the treaty has been created, that is, the protection of victims of damage caused by space objects.

Nevertheless, there exist several agreements, such as the INTELSAT Operational Agreement[351] and the ISS IGA,[352] that limit the liability of the party States for the purpose of such treaties and only within those States. Although some publicists may find a justification in the Vienna Convention of 1969, the two Articles of the Vienna Convention dealing with this matter are not so clear on the subject. Article 30 -dealing with "Application of successive treaties relating to the same subject-matter"-[353] is arguably not applicable to the case concerned, as it refers to treaties "relating to the same subject-matter", which means new agreements dealing with the same topic: liability for

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[349] See Liability Convention 1972; Article XXIII: "1. The provisions of this Convention shall not affect other international agreements in force in so far as relations between the States Parties to such agreements are concerned.2. No provision of this Convention shall prevent States from concluding international agreements *reaffirming, supplementing or extending its provisions*." [Emphasis added] *Supra* 228.

[350] See Vienna Convention 1969, Article 26: "Every treaty in force is binding upon the parties to it and must be performed by them in *good faith*." [Emphasis added]; *supra* 109.

[351] See INTELSAT Operational Agreement, *supra* 291.

[352] See ISS IGA, *supra* 230.

[353] See Vienna Convention 1969, Article 30: "Application of successive treaties relating to the same subject-matter; 1). Subject to Article 103 of the Charter of the United Nations, the rights and obligations of States parties to successive treaties relating to the same subject-matter shall be determined in accordance with the following paragraphs. 2). When a treaty specifies that it is subject to, or that it is not to be considered as incompatible with, an earlier or later treaty, the provisions of that other treaty prevail. 3). When all the parties to the earlier treaty are parties also to the later treaty but the earlier treaty is not terminated or suspended in operation under Article 59, the earlier treaty applies only to the extent that its provisions are compatible with those of the latter treaty. 4). When the parties to the later treaty do not include all the parties to the earlier one:(a) as between States parties to both treaties the same rule applies as in paragraph 3;(b) as between a State party to both treaties and a State party to only one of the treaties, the treaty to which both States are parties governs their mutual rights and obligations. 5). Paragraph 4 is without prejudice to Article 41, or to any question of the termination or suspension of the operation of a treaty under Article 60 or to any question of responsibility which may arise for a State from the conclusion or application of a treaty the provisions of which are incompatible with its obligations towards another State under another treaty." See *supra* 106.

damage caused by space objects. Therefore, agreements dealing with other space topics or activities –e.g. setting the rules for the construction and operation of an International Space Station- would have to remain subject to the provisions of the Liability Convention.

The other relevant provision, Article 41 of the Vienna Convention, deals with "Agreements to modify multilateral treaties between certain of the parties only."[354] Again, this Article does not seem to be the most appropriate to justify clauses waiving or limiting liability, as the intention of Article 41 is the *modification* of multilateral treaties. Additionally, this Article allows making the modifications only if such possibility is provided in the 'original' treaty and it "does not relate to a provision, derogation from which is incompatible with the effective execution of the object and purpose of the treaty as a whole."

Finally, to conclude this section, we will briefly examine, from the point of view of international public law, waivers of liability established by an international organization as if it were a private party, when dealing with a private party claimant, and waivers of liability between two private parties.

Since this topic will be better analyzed in the next chapter, here I just wanted to remind the reader that in conformity with the provisions of the Outer Space Treaty,[355] States are responsible (and liable if there is damage) for the activities undertaken by its public or private entities. We have also seen that it is possible for an international organization to adhere to the Liability Convention and become a 'launching state' within the terms of the Convention, as the ESA has done through a Declaration of Acceptance of Rights and Obligations.[356] Therefore, although waiver of liability may work well enough for the private relationships in which ESA may find itself under domestic law, it will not

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[354] See Vienna Convention 1969, Article 41: "Agreements to modify multilateral treaties between certain of the parties only; 1. Two or more of the parties to a multilateral treaty may conclude an agreement to modify the treaty as between themselves alone if: (a) the possibility of such a modification is provided for by the treaty; or (b) the modification in question is not prohibited by the treaty and: (i) does not affect the enjoyment by the other parties of their rights under the treaty or the performance of their obligations;(ii) does not relate to a provision, derogation from which is incompatible with the effective execution of the object and purpose of the treaty as a whole. 2. Unless in a case falling under paragraph 1 (a) the treaty otherwise provides, the parties in question shall notify the other parties of their intention to conclude the agreement and of the modification to the treaty for which it provides." See *supra* 106.

[355] See Outer Space Treaty, *supra* 213, Articles VI and VII.

[356] See *supra* 331.

apply for its international liability in any case of damage caused by a space object, including, *e.g.* damage caused by Galileo. Although a clause waiving liability may work out well between private parties from different countries, it could also entail a breach of the provisions of the Liability Convention if a State representing the interests of a damaged party presents a claim under the Liability Convention. In my opinion, the Defendant State would not be able to protect itself by calling for application of the provisions established in the private contract. Furthermore, such clauses could be considered contrary to the Liability Convention under certain circumstances, and would therefore constitute a breach of obligations under international law.

5. *Is there a need for a GNSS Convention?*

There have been endless discussions about the necessity of resolving all GNSS issues in one agreement, through the drafting of a new GNSS Convention. Issues of liability, but also of standardization and certification, remain unresolved. Indeed, some attempts to solve a number of these problems have been made. In aviation, for example, ICAO created in 1995 a Panel of Legal Experts on the Establishment of a Legal Framework with Regards to GNSS, to deal with some of the most controversial aspects of GNSS,[357] such as liability. Unfortunately, the only measure to have emerged from these initiatives is a non-binding declarative GNSS Charter,[358] relating to rights and obligations

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[357] ICAO Assembly Resolution A32-20: "[...] The Assembly: 1. Recognizes the importance of regional initiatives regarding the development of the legal and institutional aspects of GNSS; 2. Recognizes the urgent need for the elaboration, both at a regional and global level, of the basic legal principles that should govern the provision of GNSS; 3. Recognizes the need for an appropriate long-term legal framework to govern the implementation of GNSS; 4. Recognizes the decision of the Council on 10 June 1998 authorizing the Secretary General to establish a Study Group on Legal Aspects of CNS/ATM systems; and 5. Instructs the Council and the Secretary General, within their respective competencies, and beginning with a Secretariat Study Group, to: a) ensure the expeditious follow-up of the recommendations of the worldwide CNS/ATM Systems Implementation Conference, as well as those formulated by the LTEP, especially those concerning institutional issues and questions of liability; and b) consider the elaboration of an appropriate long-term legal framework to govern the operation of GNSS systems, including consideration of an international Convention for this purpose, and to present proposals for such a framework in time for their consideration by the next ordinary Session of the Assembly." Online available at <http://www.icao.int/icao/en/res/a32_20.htm> (Date accessed 16/07/2002).

[358] ICAO Doc. A 32-WP/24, Appendix A. Charter on the Rights and Obligations of States Relating to GNSS Services.. Online available at <http://www.icao.int/icao/en/res/a32_19.htm> (Date accessed 16/07/2002).

of States, as well as the achievement of some standardization for the GPS signal.[359] IMO has also come out with some proposals for standards,[360] and the International Standardization Organization has yet to play its role.[361] Paradoxically, UNCOPUOS, the United Nation's body specialized in outer space activities, has not added much at all to these efforts.[362]

As far as liability is concerned, we should ask ourselves whether it is necessary to conclude an agreement resolving this important issue. It would appear that there is no need for such a challenge. There are already sufficient means of compensating victims for damages caused by GNSS. Whether they get applied, or whether States will facilitate their applicability, is a different question. But an appropriate question is this: Why should States bury themselves into negotiations, drafting and all the other efforts required to achieve an international convention, when they do not even enforce the remedies they already have at hand? An answer to this question may be that States may not be very keen on currently available remedies, but, on the other hand, are not enthusiastic enough about creating new remedies so as actually to provide GNSS with a solution for the time being.

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[359] V. Iatsouk, ICAO Secretariat "Development of ICAO standards for the global navigation satellite system is moving ahead": "The progress in development of the SARPs has, however, been slower than expected. To date, only the GPS portion of the first SARPs package is nearing completion. SARPs for another basic element of GNSS — GLONASS — require more effort and participation by GLONASS experts in their development and validation." Online available at <http://www.icao.int/icao/en/jr/5305_ar2.htm> (Date accessed 16/07/2002).

[360] IMO Resolution A.815 (19): Worldwide Navigation System; IMO Resolution A.860 (20): Maritime policy for a future global navigation satellite system (GNSS); 22nd Assembly: 19-30 November 2001, IMO Resolution A.915 (22) Revised maritime policy and requirements for a future global navigation satellite system (GNSS): "The resolution updates the user requirements for general navigation and positioning and introduces user requirements for non-general navigation and positioning. The revised policy updates the section on current provision of global positioning systems; gives revised operational requirements for a future GNSS; revises and updates Appendix 1 – Terms used in GNSS; updates the minimum user requirements for a future GNSS, giving minimum requirements for general navigation (Appendix 2), and minimum maritime user requirements for positioning (Appendix 3); updates the indicative timetable for development of future GNSSs (Appendix 4). The resolution revokes resolution A.860 (20) on maritime policy and requirements for a future global navigation satellite system (GNSS)." Online available at <http://www.imo.org/home.asp> (Date accessed 16/07/2002).

[361] International Standardization Organization (ISO), plays a role in standardization through the Technical Committee 204 on Transport Information and Control Systems. Online available <http://www.iso.org/iso/en/stdsdevelopment/tc/tclist/TechnicalCommitteeDetailPage.TechnicalCommitteeDetail?COMMID=4559 > (Date accessed 16/07/2002).

[362] UN Doc. A/AC.105/771 (2001) United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems (Kuala Lumpur, 20-24 August 2001). Online available <http://www.oosa.unvienna.org/Reports/AC105_771E.pdf > (Date accessed 16/04/2002); Also see UN Doc. A/AC.105/L.237 Provisional Agenda of COPUOS for the 45th session, 5-14 June 2002. Online available at <http://www.oosa.unvienna.org/Reports/AC105_L237E.pdf> (Date accessed 16/07/2002).

As we have already seen, international law could be summarized as the will of States. In my opinion, national sovereignty overshadows almost every international rule, even when dealing with norms of *jus cogens*. Real remedies for breaches of international law are seldom applicable, and although any international dispute is fortunately called to be solved through diplomatic means instead of armed conflict, there is an obvious lack of permanently binding decisions on behalf of the International Court of Justice. Of course, the binding nature of the decisions is subject again to the will of each individual State.

I believe that current international liability regimes are sufficiently adequate to deal well enough with liability. If, however, one still desires to conclude an international agreement, would it not be easier, for example, to amend the Liability Convention of 1972, or to sign a Declaration of Acceptance widening or strengthening its prerogatives? Maybe it is more a matter of economics than law: the chances of paying compensation - *ex gratia* - for a hypothetical event involving GNSS may be sufficiently small that it is worth the risk of not offering guarantees or accepting liability. This approach is much safer for States, and surely much more comfortable too. Maybe what is needed in the space field is a Convention on Private Activities in Outer Space but that is the subject of another debate -and could support a separate thesis too-.

Finally, and as declared by the International Court of Justice, " [...] pure law does not exist: law is the result of social life and evolves with it; in other words, it is, to a large extent, the effect of politics -especially of a collective kind- as practised by States. We must therefore beware of considering law and politics as mutually antagonistic. Each should be permeated by the other. Politics and public opinion exercise a great influence on the exercise of the rights of States."[363]

[363] See the *Corfu Channel* case (*UK v. Albania*) 1949 ICJ 4, 41-42, *supra* 105.

Chapter III. GNSS And Liability issues under Domestic Laws.

Now that the public international perspective has been examined, this chapter will be dealing with those liability issues specifically arising within national laws. For this analysis, this chapter will study the current laws in the US, in the European Union and in the Russian Federation. Some aspects common to the civil law tradition will also be seen, as well as some other issues such as waivers of liability. Under these liability regimes, we could include satellites, receivers, and even signal malfunctions. There will also be a discussion of contract clauses used by international organizations in this area, particularly the European Space Agency.

1. *U.S. Federal Law*

Following the Korean Airlines 007 disaster of 1983,[364] President Reagan decided to make publicly available the GPS for the worldwide civil community.[365] From that date on, the U.S. Government has been providing this service to the rest of the world as well as to its own citizens free of any direct fee charge.[366]

The following U.S. Federal Acts[367] are a result of the will of the U.S. to waive its sovereign immunity for certain types of activities that may cause harm to third parties. A

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[364] E. Chiavarelli, *The KAL 007 Incident: The legal effects of ICAO decisions.* (McGill LL.M. Thesis, 1983) the facts of this tragedy can be found at page 38.

[365] See Kim, *supra* 28, slide 6.

[366] See W. F. Price, *supra* 17: Nevertheless the free-of-charge GPS system, direct fees may be charged for the augmentation systems. Also see US Code, *supra* 37. Title 10, Armed Forces; Subtitle A, General Military Law; Part IV--Service, Supply, and Procurement. Chapter 136: Provisions Relating to Specific Programs Sec. 2281. Global Positioning System: "[...] b) Sustainment and Operation for Civilian Purposes: The Secretary of Defense shall provide for the sustainment and operation of the GPS Standard Positioning Service for peaceful civil, commercial, and scientific uses on a continuous worldwide basis free of direct user fees." Also see Fact Sheet U.S. Global Positioning System Policy, *May 1, 2000* Statement by the US President Regarding the United States' Decision to Stop Degrading Global Positioning System Accuracy: "[...] We will continue to provide all of these capabilities to worldwide users free of charge [...]" Online available at <http://gps.faa.gov/GPSbasics/index.htm> (Date accessed 23/06/2002).

[367] US Department of Justice Attorneys Manual [Hereinafter DoJ USAM] 4-5.100, Tort Litigation – Generally: "Tort litigation against the Federal Government is under the general supervision of the Civil Division's Torts Branch. The Torts Branch has four different litigation offices or staffs, each of which specializes in a different area.

The *Aviation and Admiralty* Staff handles claims arising out of the government's role as aircraft or ship owner and as regulator of both air traffic and the nation's coastal and inland waterways. The *Constitutional*

question that immediately arises when dealing with immunity of States is why governments should be treated in a different way? Do they constitute a special case? As some authors have pointed out, the *rationale* for this is "partly historical, linked to the reasons for sovereign immunity[368] [...]",[369] and appears reflected in 'acts-of-States' such as administration of justice, the legislative process, and executive actions including the police, armed forces, the postal service, public transport and health services, where the general principles of liability may not apply.[370] Nevertheless, as studied before,[371] some of these areas of States immunity may be waived in certain cases, and then the government will be held liable for the wrongful or negligent acts undertaken in the observance of its duties by itself, by any of its agencies or by its employees.

Express consent of the State, in this case the US, is required in order to waive immunity.[372] In the same way as express consent is mandatory, it is also important to

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and Specialized Torts Staff represents federal employees sued in their individual capacities for actions taken within the scope of their employment and handles matters arising out of claims under the Vaccine and Radiation Exposure compensation programs. The *Environmental Torts* (formerly Environmental and Occupational Disease Litigation) Staff handles property and personal injury cases involving toxic substances in the environment, the workplace, and government-owned housing. The *Federal Tort Claims Act Staff* handles all other tort claims, including traditional actions against the government for personal injury and property damage. Cases brought under the Federal Tort Claims Act may be the responsibility of any one of the four staffs, depending upon the subject matter. Although different categories of tort cases are the responsibility of the different staffs of the Torts Branch, many aspects of defending a federal tort lawsuit are common to all, or several, categories of tort cases. For example, many of the defenses available under the Federal Tort Claims Act may be equally applicable in aviation cases, general tort cases, and cases involving exposure to hazardous substances. Similarly, it is not uncommon for a single case to present alternative causes of action which cross the boundary between particular categories. For example, a single case will often include both a constitutional tort claim against individuals and a general tort claim against the government. In addition, as will be discussed, infra, some related contract issues may be handled by the Torts Branch, and, in some circumstances, cases may be the joint responsibility of the Torts Branch and other components of the Civil Division or other Divisions of the Department." Online available at <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/5mciv.htm#4-5.100> (Date accessed 23/06/2002).

[368] See above Chapter III-I, section 2.1.

[369] J. Bell and A.W. Bradley, "Government Liability – A preliminary assessment in Government liability: A comparative study" (1991): See Weber & Grossman, Vol. II, p. 339; *supra* 325.

[370] See J. Bell and A.W. Bradley, *ibid* at 341 and 342.

[371] See *supra* 187 and *supra* 188.

[372] US DoJ USAM Civil Resource Manual 30, Immunity of the US from suit, absent express consent: "No action lies against the United States unless Congress has authorized it. See *United States v. Testan*, 424 U.S. 392, 399 (1976); *Reid v. United States*, 211 U.S. 529, 538 (1909); *Munro v. United States*, 303 U.S. 36, 41 (1938); United *States v. Sherwood*, 312 U.S. 584, 590 (1941); *Dalehite v. United States*, 346 U.S. 15, 30 (1953); United States v. Shaw, 309 U.S. 495, 500 (1940); *Feres v. United States*, 340 U.S. 135, 139 (1950); *United States v. King*, 395 U.S. 1, 4 (1969); *Hercules, Inc. v. United States*, 516 U.S. 417, 422 (1996). The immunity of the United States from suit is all embracing, and obtains without regard to the character of the proceedings or the source of the right sought to be enforced. See *Lynch v. United States*, 292 U.S. 571, 582

mention that this is "a privilege and not a property right and may be withdrawn at any time".[373] We also have to point out that the actions brought against the U.S. must be based on negligence, which must be properly pleaded and proven. Nevertheless, there has been some discussion as to what extent could the U.S. be held strictly liable for those activities that traditionally fall under strict liability laws for private individuals, such as ultra-hazardous activities.[374]

1.1 *The U.S. Federal Tort Claims Act*[375]

As it has been said, state agencies are not subject to suit unless a "statutory waiver of immunity" is enacted.[376] In common law, the general rule was that governmental

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(1934)." <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00030.htm> (November 1998) (Date accessed 23/06/2002).

[373] US DoJ USAM Civil Resource Manual 31, Consent to be sued is strictly constructed: "[...]Consent to sue is a privilege and not a property right and may be withdrawn at any time. See Lynch v. United States, supra. Repeal of a jurisdictional statute effectively withdraws jurisdiction, even as to suits previously filed and still pending on the date of repeal. See *Bruner v. United States*, 343 U.S. 112, 116 (1952); *Hallowell v. Commons*, 239 U.S. 506, 508 (1916) [...]." Online available at the US DoJ website, <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00030.htm> (November 1998) (Date accessed 23/06/2002).

[374] J. A. Bosco "Liability for outer space activities – A United States; perspective" McGill LL.M Thesis (1985) p. 97 and 98. Also see *Laird v. Nelms* case 406 U.S. 797 (1972): "The Supreme Court, Mr. Justice Rehnquist held that damage from sonic boom caused by military aircraft was not actionable under the Federal Tort Claims Act where no negligence was shown either in planning or operation of the flight, since such Act does not authorize suit against the government based on theory of strict or absolute liability for ultrahazardous activity. Judgment of the Court of Appeals reversed."

[375] US Federal Tort Claims Act [Hereinafter FTCA]. US Code Title 28, PArticle VI, Chapter 171, or 28 U.S.C. 1346 (b), 28 U.S.C. 2671 *et seq.*), The FTCA is available online at the following site <http://www.access.gpo.gov/uscode/title28/partvi_chapter171_.html> (Last updated 08/05/2002) (Date accessed 23/06/2002).

[376] See US DoJ USAM Civil Resource Manual 32, Government Agencies are not Subject to Suit, Absent Statutory Waiver of Immunity: "The terms of a statute waiving immunity from suit define the court's jurisdiction to entertain suit, and the consent is no broader than the limitations which condition it. See *United States v. Sherwood*, supra; *FDIC v. Meyer*, 510 U.S. 471 (1994); *Honda v. Clark*, 386 U.S. 484, 501 (1967). Inasmuch as the United States may not be sued in the absence of consent legislation, the claimant's right to sue is necessarily subject to such conditions as Congress has seen fit to impose, including restrictions as to time, place, and manner of suit. See *Reid v. United States*, 211 U.S. at 538; *Munro v. United States*, supra; *Dalehite v. United States*, 346 U.S. at 31. No representative of the United States has the power to waive jurisdictional conditions or limitations. See *United States v. Fitch*, 185 F.2d 471, 474 (10th Cir. 1950); *Finn v. United States*, 123 U.S. 227, 233 (1887).

Jurisdiction cannot be extended by implication beyond the plain language of the statute. See *Lane v. Pena*, 116 S.Ct. 2092 (1996); *United States v. Nordic Village*, 503 U.S. 30 (1992). *United States v. Michel*, 282 U.S. 656, 659 (1931); *Lynch v. United States*, supra; *United States v. Sherwood*, supra; *Honda v. Clark*, 386 U.S. 484, 501 (1967); *Dalehite v. United States*, *supra*.

Consent to sue is a privilege and not a property right and may be withdrawn at any time. See *Lynch v. United States*, *supra*. Repeal of a jurisdictional statute effectively withdraws jurisdiction, even as to suits

officials were completely immune from the application of tort laws, if the conduct that fall under its duties or obligations was a discretionary one. The Federal Tort Claims Act has been adopted by the U.S. Congress as the only remedy for common law torts against all federal agencies or employees regardless of the discretionary character of the conduct.[377]

Section 2671 establishes the definitions that need to be taken into account when studying the FTCA. Terms such as "Federal agency", "Employee of the government", and "Acting within the scope of his office or employment" are there defined.[378] Under the FTCA, immunity is waived for those cases in which the Government is acting as '*if a*

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previously filed and still pending on the date of repeal. See *Bruner v. United States*, 343 U.S. 112, 116 (1952); *Hallowell v. Commons*, 239 U.S. 506, 508 (1916). It makes no difference which party was successful in the district court, for, if timely appeal is taken, the case remains a "pending suit" which must be dismissed upon withdrawal of jurisdiction. See *Gulf Refining Co. v. United States*, 269 U.S. 125, 137 (1925); *Gulf, Col. & S.F. Ry. v. Dennis*, 224 U.S. 503, 506 (1912); *United States v. The Schooner Peggy*, 1 Cranch (5 U.S.) 102, 110 (1801)." Online information available at the US DoJ website <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00032.htm> (November 1998) (Date accessed 23/06/2002).

[377] See US DoJ USAM Civil Resource Manual 33, Immunity of Government Officers Sued as Individuals for Official Acts: "The general rule at common law was that in order for a government official to be protected by absolute immunity for common law torts, not only did the official have to be acting within the outer perimeter of his/her official duties, but the conduct at issue also had to be discretionary in nature. Westfall v. Irwin, 484 U.S. 292, 297-298 (1988). In enacting the Federal Employees Liability Reform and Tort Compensation Act of 1988 (FELRTCA), Congress abrogated this common law rule and extended absolute immunity for common law torts to all federal employees regardless of whether the conduct at issue was discretionary. See *United States v. Smith*, 499 U.S. 160 (1991). FELRTCA confers such immunity by making the Federal Tort Claims Act the exclusive remedy for all common law torts committed by federal employees while acting within the scope of their office or employment. 28 U.S.C. § 2679(b)(1). However, the immunity conferred by FELRTCA does not extend or apply to suits against federal employees for violation of the Constitution or federal statutes. Thus, government officials sued for constitutional torts continue to be protected only by qualified immunity. 28 U.S.C. § 2679(b)(2). See *Harlow v. Fitzgerald*, 457 U.S. 800, 807 (1982); *Butz v. Economou*, 438 U.S. 478 (1978). Where applicable, qualified immunity protects an official from trial and the burdens of litigation. See *Mitchell v. Forsyth*, 472 U.S. 511, 526 (1985)." <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00033.htm> (November 1998) (Date accessed 23/06/2002).

[378] US FTCA, Section 2671. "As used in this chapter and sections 1346(b) and 2401(b) of this title, the term "Federal agency" includes the executive departments, the judicial and legislative branches, the military departments, independent establishments of the United States, and corporations primarily acting as instrumentalities or agencies of the United States, but does not include any contractor with the United States. "Employee of the government" includes (1) officers or employees of any federal agency, members of the military or naval forces of the United States, members of the National Guard while engaged in training or duty under section 115, 316, 502, 503, 504, or 505 of title 32, and persons acting on behalf of a federal agency in an official capacity, temporarily or permanently in the service of the United States, whether with or without compensation, and (2) any officer or employee of a Federal public defender organization, except when such officer or employee performs professional services in the course of providing representation under section 3006A of title 18. "Acting within the scope of his office or employment", in the case of a member of the military or naval forces of the United States or a member of the National Guard as defined in section 101(3) of title 32, means acting in line of duty." *Supra* 375.

private person' and will be held liable for "[...] injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee [...]" in accordance with the law of the place where the act or omission occurred.[379] This provision is reaffirmed in Section 2674, dealing with the liability of the US, which will be held liable "[...] in the same manner and to the same extent as a private individual under like circumstances [...]".[380] Section 2675 establishes the obligation of bringing a first claim directly to the Agency that committed the negligent act or omission, and in the case of denial on the part of the Agency, the claim may be raised under the FTCA.[381] Finally, exceptions to the applicability of the FTCA are found in section 2680.[382] For the purpose

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[379] See US FTCA, Section 2672, *supra* 375.

[380] See US FTCA, Section 2674: "The United States shall be liable, respecting the provisions of this title relating to tort claims, in the same manner and to the same extent as a private individual under like circumstances, but shall not be liable for interest prior to judgment or for punitive damages.
If, however, in any case wherein death was caused, the law of the place where the act or omission complained of occurred provides, or has been construed to provide, for damages only punitive in nature, the United States shall be liable for actual or compensatory damages, measured by the pecuniary injuries resulting from such death to the persons respectively, for whose benefit the action was brought, in lieu thereof. With respect to any claim under this chapter, the United States shall be entitled to assert any defense based upon judicial or legislative immunity which otherwise would have been available to the employee of the United States whose act or omission gave rise to the claim, as well as any other defenses to which the United States is entitled. With respect to any claim to which this section applies, the Tennessee Valley Authority shall be entitled to assert any defense which otherwise would have been available to the employee based upon judicial or legislative immunity, which otherwise would have been available to the employee of the Tennessee Valley Authority whose act or omission gave rise to the claim as well as any other defenses to which the Tennessee Valley Authority is entitled under this chapter ." *Supra* 375.

[381] See US FTCA, Section 2675, *supra* 375.

[382] See US FTCA, Section 2680: "The provisions of this chapter and section 1346(b) of this title shall not apply to - (a*) Any claim based upon an act or omission of an employee of the Government, exercising due care, in the execution of a statute or regulation, whether or not such statute or regulation be valid, or based upon 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 be abused.* (b) Any claim arising out of the loss, miscarriage, or negligent transmission of letters or postal matter. (c) Any claim arising in respect of the assessment or collection of any tax or customs duty, or the detention of any goods, merchandise, or other property by any officer of customs or excise or any other law enforcement officer, except that the provisions of this chapter and section 1346(b) of this title apply to any claim based on injury or loss of goods, merchandise, or other property, while in the possession of any officer of customs or excise or any other law enforcement officer, if - (1) the property was seized for the purpose of forfeiture under any provision of Federal law providing for the forfeiture of property other than as a sentence imposed upon conviction of a criminal offense; (2) the interest of the claimant was not forfeited; (3) the interest of the claimant was not remitted or mitigated (if the property was subject to forfeiture); and (4) the claimant was not convicted of a crime for which the interest of the claimant in the property was subject to forfeiture under a Federal criminal forfeiture law. (d) *Any claim for which a remedy is provided by sections 741-752, 781-790 of Title 46, relating to claims or suits in admiralty against the United States.* (e) Any claim arising out of an act or omission of any employee of the Government in administering the provisions of sections 1-31 of Title 50, Appendix. (f) Any claim for damages caused by the imposition or establishment of a quarantine by the United States. (g) Repealed. Sept. 26, 1950, ch. 1049, Sec. 13 (5), 64 Stat. 1043.) (h) Any claim arising out of assault, battery, false imprisonment, false arrest, malicious prosecution, abuse of process, libel, slander, misrepresentation, deceit, or interference with

of this thesis, the two most remarkable exceptions are those under paragraphs *(a)* and *(k)*. In paragraph *(a)* the discretionary function exception is met, and it exempts the U.S. from liability for those damages arising from the use or abuse of discretionary powers.[383] One important case relating to the discretionary exemption that also could be analogously and logically applied to GNSS is *Indian Towing Co. v. United States*, where the Court held the U.S. Coast Guard liable for the negligent operation of a lighthouse, resulting in damage. The Court explained:

> The Coast Guard need not undertake the lighthouse service. But once it exercised its discretion to operate a light on Chandeleur Island and engendered reliance on the guidance afforded by the light, it was obligated to use due care to make certain that the light was kept in good working order; and, if the light did become extinguished, then the Coast Guard was further obligated to use due care to discover this fact and to repair the light or give warning that it was not functioning. If the Coast Guard failed in its duty and damage was thereby caused to petitioners, the United States is liable under the Tort Claims Act.[384]

In U.S. law the so-called "Good Samaritan doctrine" also exists. This doctrine has been recognized in the Restatement (Second) of Torts, under section 323, and consists of the creation of obligations for those who perform a service in a gratuitous manner, when those services are "[...] necessary for the protection of the other's person or things [...]".[385] Some authors, as B. Elder, also agree: "Once the Government takes the decision

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contract rights: Provided, That, with regard to acts or omissions of investigative or law enforcement officers of the United States Government, the provisions of this chapter and section 1346(b) of this title shall apply to any claim arising, on or after the date of the enactment of this proviso, out of assault, battery, false imprisonment, false arrest, abuse of process, or malicious prosecution. For the purpose of this subsection, "investigative or law enforcement officer" means any officer of the United States who is empowered by law to execute searches, to seize evidence, or to make arrests for violations of Federal law. (i) Any claim for damages caused by the fiscal operations of the Treasury or by the regulation of the monetary system. (j) *Any claim arising out of the combatant activities of the military or naval forces, or the Coast Guard, during time of war.* (k) *Any claim arising in a foreign country.* (l) Any claim arising from the activities of the Tennessee Valley Authority. (m) Any claim arising from the activities of the Panama Canal Company. (n) Any claim arising from the activities of a Federal land bank, a Federal intermediate credit bank, or a bank for cooperatives." [Emphasis added] S*upra* 375.

[383] Some leading cases are *Dalehite v. United States* 346 U.S. 15 (1953), *Indian Towing Co. v. United States* 350 U.S. 61 (1955), and *Hayes v. United States* 899 F.2d 438 (5th Cir. 1990).

[384] See *Indian Towing Co. v. United States* 350 U.S. 61, 126-127 (1955).

[385] See the Restatement of the Law Second, Torts. [Hereinafter Restatement (2nd) of Torts] (American Law Institute. American Law Institute Publishers, St. Paul, Minnesota (1965-)). Section 323 "One who undertakes, gratuitously or for consideration, to render services to another which he should recognize as necessary for the protection of the other's person or things, is subject to liability to the other for physical harm resulting from failure to exercise reasonable care to perform his undertaking if (a) his failure to

to undertake those discretionary acts, it is under an obligation to act reasonably in the operational context of providing that service."[386] Furthermore, Courts have also narrowed the applicability of the exemption of paragraph *(a)* of the FTCA.[387] In addition, U.S. Major Spradling asserts "the U.S. has a duty to warn civil users of problems with the [GPS] system that can have an adverse consequence on them."[388] In my opinion, failing to warn could therefore lead to the said "negligence or wrongful act or omission of any employee [...]".[389]

This could also be connected to the second important exemption, found in paragraph *(k)* and determining the place where the claim arises. This exception says that the U.S. will not be held liable for "any claim arising in a foreign country."[390] Here, the term 'arising' is problematic, since it can be interpreted in two different ways. First, a claim may arise in the place where damage is caused. Second, it may arise in the place where the breach of duty occurs, regardless of where damage occurs. One illustrative case that is apposite is the *1974 Paris air crash* case. Although this accident occurred in France, it was brought under the FTCA as the act (wrongful approval of a certificate of inspection) was alleged to have taken place in California.[391] On the other hand, in the case

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exercise such care increases the risk of such harm, or (b) the harm is suffered because of the other's reliance upon the undertaking."

[386] See Elder, *supra* 17, p. 901.

[387] *Ingham v. Eastern Airlines* 373 F. 2d 227, 238 (C.A.N.Y. 1967): "The government also argues that reporting weather changes to incoming flights when the visibility is above the minimums is a 'discretionary' function and therefore under § 2680(a) it cannot serve as the basis for imposing tort liability. This argument also lacks merit. When the government decided to establish and operate an air traffic control system, that policy decision was the exercise of 'discretion' at the planning level, and could not serve as the basis of liability. See *Dalehite v. United States*, *supra*. But once having made that decision, the government's employees were required thereafter to act in a reasonable manner. A failure to do so rendered the government liable for the omission or commission. *Indian Towing Co. v. United States*, 350 U.S. 61, 76 S.Ct. 122, 100 L.Ed. 48 (1955). Thus, it has been decided that the government can be held liable for the negligence of its air traffic controllers. See *Eastern Air Lines v. Union Trust Co.*, 95 U.S.App.D.C. 189, 221 F.2d 62, aff'd sub nom., *United States v. Union Trust Co.*, 350 U.S. 907, 76 S.Ct. 192, 100 L.Ed. 796 (1955)."

[388] K. K. Spradling, "The International Liability Ramifications of the US NAVSTAR Global Positioning System" Proceedings of the 33th Colloquium of the IISL of the International Austrounautical Federation, Published by the American Institute of Aeronautics and Astronautics, Dresden, Germany (October 6-12, 1998), p. 94.

[389] See US FTCA, Section 2680, *supra* 382.

[390] See US FTCA, *ibid.*

[391] *In re Paris Air Crash of March 3, 1974*, 399 F. Supp. 732, 737-738: "All of the acts or failures to act of the United States upon which plaintiffs rely are alleged in the complaints to have occurred in the United States, in the State of California, by the wrongful approval, certification, inspection, and the like, of the plane, or the failure to do so, by the United States, and by its failure to require changes in the structure of portions of the plane and follow-through before and after delivery of it, even though those acts or failures

Smith v. United States, dealing with a casualty that occurred in the Antarctica,[392] the Supreme Court considered this territory as a foreign country, and opted for the first of the two interpretations.

L.S.-B. Bornemann has come to the conclusion that the FTCA should cover Outer Space, as it should have covered Antarctica.[393] He indicates that historical background and case law previous to the 1993 Antarctica case[394] reveal the clear intention of the U.S. Congress and judicial system not to preclude compensation for cases similar to the Antarctica one. Although this is an exemption to the traditional immunity of the U.S., and therefore should be strictly applicable, there is also a need to refer and consider the will of

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came to fruition in another state or in a foreign country. Roberts v. United States, 498 F.2d 520, 522, fn.2 (9th Cir. 1974): 'Under the FTCA, a tort claim arises at the place where the negligent act or omission occurred and not where the negligence had its 'operative effect,' (i.e., the situs of injury). Richards v. United States, 369 U.S. 1, 82 S.Ct. 585, 7 L.Ed.2d 492 (1962)'; Aanestad v. Beech Aircraft Corp., 521 F.2d 1298 (9th Cir. 1974, June 20, 1974); L. D. Reeder Contractors v. Higgins Industries, 265 F.2d 768, 773-74, fn. 12 (9th Cir. 1959), quoting 47 Geo.L.J. 342, 351- 52 (1958). Thus, none of the claims against the United States for death, as alleged in the complaints, is a 'claim arising in a foreign country.' All of the conduct, whether 'act or omission,' on the other hand, occurred as the result of acts allegedly arising, i.e., occurring, in California, and, under 28 U.S.C. § 1346(b), resulted in 'claims against the United States, for money damages, accruing [. . .] for [. . .]death caused by the negligent or wrongful act or omission of any employee of the Government while acting within the scope of his office or employment, under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.' (emphasis added.) Hence, under the allegations of the complaints, the law of California, including its 'choice-of-law' rule, was, and is, applicable to the United States." Also see *Kasel v. Remington Arms Co.*, 24 Cal.App.3d 711, 731 (1972): "The forum has a definite interest in applying its own law," and it "will be displaced only if there is a compelling reason for doing so."

[392] *Smith v. U.S.*, 507 U.S. 197, 202 (1993): "But coupled with what seems to us the most natural interpretation of the foreign-country exception, this portion of § 1346(b) reinforces the conclusion that Antarctica is excluded from the coverage of the FTCA."

[393] L.S.-B. Bornemann, "This is ground control to Major Tom... your wife would like to sue... but there is nothing we can do... The under-likelihood that the FTCA waives sovereign immunity for torts committed by United States employees in outer space: a call for pre-emptive legislation." JALC Vol.63 (1997-1998) at 517. Conclusion at page 536.

[394] *Smith v. US*, 953 F.2d 1116, 1120 (9th Cir. 1991), Fletcher, J., dissenting: "The majority concludes that Antarctica, a "sovereignless region without civil tort law," *ante* at 1117, represents a foreign country for purposes of the Federal Tort Claims Act (FTCA), and hence that plaintiff Sandra Jean Smith's suit is barred by Section 2680(k) of the Act, under which the United States has retained its sovereign immunity against claims "arising in a foreign country." I respectfully dissent because the majority pays insufficient attention to the purposes underlying the FTCA and its foreign country provision and ignores the sound reasoning of the D.C. Circuit in *Beattie v. United States,* 756 F.2d 91 (D.C.Cir.1984), the only other circuit court case to address the FTCA's applicability to claims arising in Antarctica. I agree with the majority that since Congress did not define what it meant by the term "foreign country" in enacting Section 2680(k), "we must ascertain a definition for 'foreign country' that is compatible with the context and purpose of the FTCA [...] The FTCA was "designed primarily to remove the sovereign immunity of the United States [...] [and] to render the Government liable in tort as a private individual would be [...]" *Richards v. United States,* 369 U.S. 1, 6, 82 S.Ct. 585, 589, 7 L.Ed.2d 492 (1962); *see also Rudelson v. United States,* 602 F.2d 1326, 1333 (9th Cir.1979).

U.S. Congress in regard to these immunity waivers.[395] Bornemann points out that the U.S. Congress rejected a proposal limiting the geographical scope of the FTCA, and he further explains how the wording 'foreign country' was chosen to exclude government liability under foreign law. Therefore, the adoption by the U.S. Congress of broad statutory language should not be overcome by "a narrow or restrictive [Court] interpretation".[396] In addition, as Bornemann keeps on indicating,[397] there were 45 years of prior case law supporting the Congress view with only one exception.[398] Furthermore, in 1984 a similar case to the 1993 Antarctica case was decided by a District Court, and the Court found that the exception could not be applicable to Antarctica because the lack of foreign dominion insured that the U.S. could not be held liable under the laws of a foreign country Significantly in this *Beattie v. US*, 1984, case the Court analogized outer space to Antarctica with respect to lack of foreign dominion.[399]

Finally, the strongest sign of the applicability of the FTCA in Antarctica or in outer space is the fact that waiver of immunity is also widely applied in the high seas through suits under the Admiralty Act, which will be later analysed. For any case not covered by this Act, the only recourse left is the FTCA.[400] In addition, under the FTCA, it is important to mention that an "employee of the Government" must commit the acts or omissions. Obviously it is quite difficult to imagine a GNSS satellite acting in a negligent or wrongful manner, so it is more logical and makes more legal and common sense to establish that any claim arising from damage caused to civilians in a third country due to a faulty signal (or satellite) coming from outer space, but where the ground operation base

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[395] See Bosco, *supra* 374, p. 91.
[396] See Bosco, *supra* 374, p. 93.
[397] See Bornemann, *supra* 393, p. 519 to 521.
[398] *US v. Spelar,* 338 U.S. 217, 220-221 (1949) " The amended version identified the coverage of the Act with the scope of United States sovereignty."
[399] *Beattie v. US,* 756 F.2d 91, 99, 105 (D.C. Cir. 1984): "The legal status of Antarctica has been most frequently analogized to outer space. [FN47] United States spokesmen suggested the 1959 Antarctic Treaty as a possible model for an outer space treaty during initial formulation discussions in 1965 and 1966. [FN48] Obviously, the provisions of a treaty relating to outer space are only relevant to the present case by analogy. However, they are instructive as to the way in which the United States has acted with reference to sovereign immunity and liability for acts of its agents in a context very similar to Antarctica.... All of this attempted limitation of coverage rests on one indefensible concept--that Antarctica is a "foreign country." Such an interpretation does violence to the plain meaning of the statute and the purpose behind the "foreign country" exception."
[400] See Bornemann, *supra* 393, p. 528 and 529.

is located, that is, in the U.S.[401] Failing to alert from a malfunctioning satellite or signals errors could lead to the faulty or negligence conduct or omission to which the FTCA refers. It is also important here to make reference to Article VI of the Outer Space Treaty of 1967, by which states undertake to bear international responsibility for, and continue supervision of, their space activities, and also to Article VIII, by which States retain jurisdiction and control over space objects while in outer space.[402] Therefore, there is to a certain extent an extension of the territorial jurisdiction of states not to the outer space itself, but to the objects there found.

A final exemption that deserves special consideration is found under Section 2680 paragraph *(j)* of the FTCA: the U.S. will not accept liability for acts or omissions "during time of war".[403] This means that during wartime GPS could be disconnected without prior warning, and the U.S. would not be held liable under the FTCA for any damage caused. The problem here is to determine when the U.S. finds itself in a 'time of war'.[404]

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[401] On a similar way, see P. Nesgos, *National law and commercial activities in outer space*, D.C.L. Thesis, Institute of Air and Space Law, McGill University, Montreal (September 1983), p. 111; Also see Bosco *supra* 374, p. 101 and 102.

[402] See Outer Space Treaty, Articles VI and VIII; *supra* 213.

[403] See US FTCA, Section 2680, *supra* 382.

[404] I wonder whether the US currently finds itself under time of war. Although the US Congress has not made an official declaration of war, we should not forget that the terrorist attack of 11/09/2001 was followed by a declaration of 'Act of War': 107th CONGRESS, 1st Session, U.S. H. J. RES. 62, JOINT RESOLUTION: "Declaring a state of war between the United States and international terrorists and their sponsors. [...]Pursuant to Article 1, section 8 of the United States Constitution, the Congress hereby declares that a state of war exists between the United States and--(1) any entity that committed the acts of international terrorism against the United States on September 11, 2001, or commits acts of international terrorism against the United States thereafter; and (2) any country or entity that has provided or provides support or protection for any entity described in paragraph (1).[...]" Online available at <http://rs9.loc.gov/cgi-bin/query/C?c107:./temp/~c1077Tsc7z > (Date accessed 23/06/2002). Also BBC News: "US President George Bush has said Tuesday's attacks on the World Trade Center and the Pentagon were "an act of war"." This information was extracted from the BBC news online website at <http://news.bbc.co.uk/hi/english/world/americas/newsid_1537000/1537534.stm>(Lastupdated 12/09/2001) (Date accessed 23/06/2002). The US also has called for application of Article 51 of the UN Charter dealing with self-defence, which allowed the US to call for Article 5 of the the North Atlantic Treaty of 1949, on collective self-defence: "Article 5. The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognised by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area. Any such armed attack and all measures taken as a result thereof shall immediately be reported to the Security Council. Such measures shall be terminated when the Security Council has taken the measures necessary to restore and maintain international peace and security." The North Atlantic Treaty of 1949 is available online at <http://www.nato.int/docu/basictxt/treaty.htm> (Date accessed 23/06/2002)

Apart from the regulatory exceptions established by the FTCA, courts have also created other exceptions. The best known is "the doctrine that takes its name from *Feres v. United States*,[405] holding that members of the Armed Forces cannot sue the Government."[406]

1.2 *Suits in Admiralty Act*[407] *and the Death on the High Seas Act.*[408]

In section 2680 of the FTCA, exception *(d)*[409] affirms that the FTCA will not apply for claims arising under the Admiralty Act. The jurisdiction of the U.S. has been extended in section 740 under this SIAA, which constitutes the exclusive remedy.[410] Section 741,[411] together with section 781, sets up the provision waiving U.S. immunity:

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[405] *Feres v. United States*, 340 U.S. 135 (1950)

[406] D. W. Robertson, S. F. Friedell, and M. F. Sturley, *Admiralty and Maritime Law in the United States*, (Caroline Academic Press, Durham, North Carolina - 2001), p. 561.

[407] Suits in Admiralty Act [Hereinafter SIAA] U.S.C. 46A Appendix, Chapter 19A, 20 and 22. These Acts are online available <http://www.access.gpo.gov/uscode/title46a/46a_14_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[408] Death on the High Seas Act [Hereinafter DOHSA] U.S.C. Title 46 Appendix, Chapter 21, Section 761 *et seq.;* <http://www.access.gpo.gov/uscode/title46a/46a_16_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[409] See US FTCA, Section 2680, *supra* 382; "(d) Any claim for which a remedy is provided by sections 741-752, 781-790 of Title 46, relating to claims or suits in admiralty against the United States."

[410] US SIAA, Title 46 Appendix, Chapter 19A, Section 740. Extension of admiralty and maritime jurisdiction; libel *in rem* or *in personam*; exclusive remedy; waiting period: "The admiralty and maritime jurisdiction of the United States shall extend to and include all cases of damage or injury, to person or property, caused by a vessel on navigable water, notwithstanding that such damage or injury be done or consummated on land. In any such case suit may be brought *in rem* or *in personam* according to the principles of law and the rules of practice obtaining in cases where the injury or damage has been done and consummated on navigable water: *Provided*, That as to any suit against the United States for damage or injury done or consummated on land by a vessel on navigable waters, the Public Vessels Act [46 App. U.S.C. 781 et seq.] or Suits in Admiralty Act [46 App. U.S.C. 741 et seq.], as appropriate, shall constitute the exclusive remedy for all causes of action arising after June 19, 1948, and for all causes of action where suit has not been hitherto filed under the Federal Tort Claims Act: *Provided further*, That no suit shall be filed against the United States until there shall have expired a period of six months after the claim has been presented in writing to the Federal agency owning or operating the vessel causing the injury or damage." Online available at <http://www.access.gpo.gov/uscode/title46a/46a_14_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[411] US SIAA, U.S.C. Title 46 Appendix, Chapter 20, section 741, "*No vessel owned by the United States* or by any corporation in which the United States or its representatives shall own the entire outstanding capital stock or in the possession of the United States or of such corporation or operated by or for the United States or such corporation, and no cargo owned or possessed by the United States or by such corporation, shall after March 9, 1920, in view of the provision herein made for a libel in personam, *be subject to arrest or seizure by judicial process* in the United States or its possessions [...]" [Emphasis added] Online available at <http://www.access.gpo.gov/uscode/title46a/46a_15_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

> A libel *in personam* in admiralty may be brought against the United States, or a petition impleading the United States, for damages caused by a public vessel of the United States, and for compensation for towage and salvage services, including contract salvage, rendered to a public vessel of the United States [...][412]

Regarding GNSS, suits under the SIAA could be applicable for cases of damaged ships guided by GPS, or damage caused by an accident that occurred due to, *e.g.*, a disruption of the GPS signals. In the case of GPS, also important is section 785, which deals with suits brought by foreign nationals. In respect to the SIAA,

> No suit may be brought under this chapter by a national of any foreign government unless it shall appear to the satisfaction of the court in which suit is brought that said government, under similar circumstances, allows nationals of the United States to sue in its courts.[413]

It is also worthy of note that the SIAA has been applied to aviation accidents occurring in the air space over the high seas. The U.S. Supreme Court established in *Executive Jet Aviation v. City of Cleveland,* 1972, a relationship between aviation and maritime activity, so that aviation activity could fall under the terms of the SIAA.[414] But subsequent legislation and case law[415] have established, to the contrary, that aviation cases do not fall under the scope of the SIAA.[416] Another case is *Sisson v. Ruby* of 1990,[417] which established rules to bring a suit in admiralty, requiring the accident to a) arise on the high seas or navigable waters of the US, b) have posed a potential threat to maritime commerce, and c) be substantial related to traditional maritime activity. Finally,

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[412] US SIAA, U.S.C. Title 46 Appendix, Chapter 22, Section 781, online available at <http://www.access.gpo.gov/uscode/title46a/46a_17_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[413] US SIAA, U.S.C. Title 46 Appendix, Chapter 22, Section 785, online available at <http://www.access.gpo.gov/uscode/title46a/46a_17_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[414] *Executive Jet Aviation v. City of Cleveland* 409 U.S. 249, 268, 271 (1972) that affirmed that there was no significant relation between maritime activities and aviation activities, but also that "under the Death on the Seas Act, a wrongful death action arising out of an airplane crash... may clear ly be brought in a federal admiralty court."

[415] *Miller v. United States*, 725 F.2d 1311, 1315 (11th Cir. 1984), cert. Denied, 469 U.S. 821 (1984); *McPherson v. Union Oil Co.*, 628 F. Supp. 265, 268 (S.D. Texas 1985).

[416] See Bosco, *supra* 374, p. 141.

[417] *Sisson v. Ruby*, 497 U.S. 358, 358: (1990), "Maritime jurisdiction is appropriate when a potential hazard to maritime commerce arises out of an activity that bears a substantial relationship to traditional maritime activity."

woth is also to mention *Universe Tankships, Inc. v. United States*[418] where the Court held the Government liable[419] for the grounding of a vessel because of a buoy out of position, and despite the fact that there were policy regulations stating that the buoy positions are relative and they should not be used as the sole means of fixing the position.[420] The similarity between this case and one that, instead of buoy positions as the sole means of navigation, involves GPS positioning, is quite evident.

The Death on the High Seas Act (DOHSA)[421] (enacted by Congress in 1920[422]) comes into play when an accident, which in principle would be contemplated under the SIAA, results in death.[423] The amount of recovery is established in section 762, which requires it to "be a fair and just compensation for the pecuniary loss sustained".[424] It is important here to mention the action of rights granted by DOHSA, which permits the taking of simultaneous actions both under U.S. law and the law of a foreign country also granting that right.[425] The DOHSA is applicable to ships, but also is applicable to any death resulting on the high seas or in the air space above. A recent case is *Dooley v.*

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[418] *Universe Tankships, Inc. v. United States* 336 F. Supp. 282 (E.D. Penn. 1972).

[419] *Universe Tankships, Inc. v. United States* 336 F. Supp. 282, 296: "The United States is solely liable for all losses and damage sustained by the ORE SATURN as a result of the grounding in Enterprise Range on February 10, 1964."

[420] *Universe Tankships, Inc. v. United States* 336 F. Supp. 282, 285 "The position of a buoy shall be determined by observations of the aid, at the time the work is being done, by sextant angles and/or bearings on fixed objects readily identified on the chart, when possible. When such methods are not feasible, obtain position by utilizing radio aids to navigation, radar, loran, soundings, or, if necessary, by dead reckoning. When such methods are used, record complete data under REMARKS."

[421] See DOHSA, *supra* 408.

[422] DOHSA was enacted in March 30th 1920, this Act is available online at <http://www.access.gpo.gov/uscode/title46a/46a_16_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

[423] US DOHSA Section 761: "Whenever the death of a person shall be caused by wrongful act, neglect, or default occurring on the high seas beyond a marine league from the shore of any State, or the District of Columbia, or the Territories or dependencies of the United States, the personal representative of the decedent may maintain a suit for damages in the district courts of the United States, in admiralty, for the exclusive benefit of the decedent's wife, husband, parent, child, or dependent relative against the vessel, person, or corporation which would have been liable if death had not ensued." *Supra* 408.

[424] US DOHSA Section 762: "The recovery in such suit shall be *a fair and just compensation for the pecuniary loss sustained* by the persons for whose benefit the suit is brought and shall be apportioned among them by the court in proportion to the loss they may severally have suffered by reason of the death of the person by whose representative the suit is brought." [Emphasis added] S*upra* 408.

[425] US DOHSA Section 764: "Whenever a right of action is granted by the law of any foreign State on account of death by wrongful act, neglect, or default occurring upon the high seas, such right may be maintained in an appropriate action in admiralty in the courts of the United States without abatement in respect to the amount for which recovery is authorized, any statute of the United States to the contrary notwithstanding." *Supra* 408.

Korean Airlines where the U.S. Supreme Court recognizes the applicability of the DOHSA to aviation accidents, and also affirms that DOHSA would not allow recovery for pain and suffering as "[...] neither state nor general maritime law can permit recovery of loss-of-society damages [...]" but only "[...] allows certain relatives of a decedent to sue for their own pecuniary losses."[426] It is important to note that the DOHSA has been amended in relation to aviation, extending the limit of damage and recoverable damages, and updating the concept of high seas to extend to within 12 miles of a coastline for any death occurring after July the 16th 1996.[427] Therefore, the *Zicherman v. Korean Airlines*[428] doctrine of recoverable damages limited to pecuniary damages has been modified.[429]

As a conclusion, damage arising from a GPS signal malfunction causing damage on the high seas could theoretically fall under the SIAA, or in the case of an accident resulting in death, under the DOHSA. Again, causation seems to be the key element when dealing with GNSS.

1.3 Foreign Claims Act[430] *and Military Claims Act*[431]

The Foreign Claims Act and Military Claims Act both provide an administrative means of recovery for persons native to a foreign country with claims against the United States for damage caused to them by the U.S. Armed Forces.[432] They are both found in Title 10 of the U.S. Code. They may be especially relevant for damages caused by a GPS failure, even in time of war or for those claims arising in a foreign country, where the

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[426] *Dooley v. Korean Airlines*, 524 U.S. 116, 116 (1998).

[427] US House of Representatives, Committee on Transport and Infrastructure. Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR 21). Conference Report, Title IV on Family Assistance. Online available at <http://www.house.gov/transportation/aviation/issues/air21conf/Title4.pdf> (Date accessed 24/06/2002).

[428] *Zicherman v. Korean Airlines Co. Ltd.* 516 U.S. 217 (1996).

[429] For further information, see J.J. Stepp and M. J. Aubuchon, "Flying over troubled waters: the collapse of DOHSA's historic applications to litigation arising from high seas commercial airline accidents." JALC Vol. 65, (1999-2000).

[430] Foreign Claims Act [Hereinafter FCA] 10 U.S.C., Subtitle A part IV, Chapter 163, section 2734, The FCA is available online at the following US Government website < http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC2734 > (Last updated 08/05/2002) (Date accessed 25/06/2002).

[431] Military Claims Act [Hereinafter MCA] 10 U.S.C., Subtitle A part IV, Chapter 163, sections 2731 *et seq.* Online available <http://www.access.gpo.gov/uscode/title10/subtitlea_partiv_chapter163_.html> (Last updated 08/05/2002) (Date accessed 25/06/2002).

[432] See Epstein, *supra* 298, p. 268.

FTCA would not always be applicable as it has been already studied in its exemptions *(j)* and *(k)*[433] and following the *Antarctica* jurisdictional trend.[434] Section 2734 provides us with the basis for such claims against the U.S.:

> [...] for (1) damage to, or loss of, real property of any foreign country or of any political subdivision or inhabitant of a foreign country, including damage or loss incident to use and occupancy, (2) damage to, or loss of, personal property of any foreign country or of any political subdivision or inhabitant of a foreign country, including property bailed to the United States; or (3) personal injury to, or death of, any inhabitant of a foreign country [...][435]

A claim may be "presented within two years after it accrues" and compensation, in order to be paid, must be accepted by the claimant in "full satisfaction."[436] It is important to make note that the compensation paid, in any case, is considered *ex gratia,* carrying no legal obligation for the U.S. Government.[437]

On the other hand, military claims are provided for in section 2733, which grants the possibility for relief for those cases not falling under the FCA.[438] It is also an administrative claim, through which an *ex gratia* compensation may be paid.[439]

2. *Private U.S. Law*

Before beginning this section we have to bear in mind that U.S. common law is a *compendium* of federal law and state law. Additionally, every State of the U.S. also has its own tribunals. For these reasons, a broad view of the current laws will be ofered, concentrating on the main principles of law.

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[433] See US FTCA, Section 2680, *supra* 382.
[434] See *Smith v. U.S.,* 507 U.S. 197 (1993), *supra* 392.
[435] See FCA, *supra* 430.
[436] See FCA, *ibid*, paragraphs (b). 1 and (e).
[437] See Spradling, *supra* 388, p. 95.
[438] See MCA, section 2733 "[...] a claim against the United States for (1) damage to or loss of real property, including damage or loss incident to use and occupancy; (2) damage to or loss of personal property, including property bailed to the United States and including registered or insured mail damaged, lost, or destroyed by a criminal act while in the possession of the Army, Navy, Air Force, Marine Corps, or Coast Guard, as the case may be; or (3) personal injury or death; either caused by a civilian officer or employee of that department, or the Coast Guard, or a member of the Army, Navy, Air Force, Marine Corps, or Coast Guard, as the case may be, acting within the scope of his employment, or otherwise incident to noncombat activities of that department, or the Coast Guard." *Supra* 431.
[439] See Spradling, *supra* 388, p. 97.

2.1 *Contractual Liability*

Contract is defined in the U.S. law as "the total legal obligation which results from the parties' agreement as affected by this [Uniform Commercial Code] Act and any other applicable rules of law",[440] while the term 'agreement' is defined inturn by the Uniform Commercial Code as "the bargain of the parties in fact as found in their language or by implication from other circumstances including course of dealing or usage of trade or course of performance as provided in this Act [...]".[441]

In principle, contract liability will only affect the parties bound by the contract, due to the principles of *pacta sum servanda*[442] and privity of contract.[443] Liability will appear when a breach of contract occurs, and sometimes the liability or reparation therefore will be established in contractual clauses within the contract.

Damage caused by GNSS may be the result of a malfunctioning satellite or receiver. A resulting breach of contract may then be absolute or partial. The Courts will determine this point upon the analysis of the following elements:[444]

- The extent to which the victim will be deprived of its expected benefits;
- The degree to which the victim can be adequately compensated for the lost profit;
- The extent to which the party in breach will suffer fine;
- The reaction of the breaching party in order to cure its failure;

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[440] US Uniform Commercial Code [Hereinafter UCC] (30th Ed. 1994) Official Text with Comments. West Publishing. The American Law Institute, 4025 Chestnut Street, Philadelphia, Penn. 19104; and the National Conference of Commissioners on Uniform State Laws. 676 North St. Clair Street, Suite 1700, Chicago, Ill. 60611. Online available <http://www.law.cornell.edu/ucc/1/overview.html>, citing Article 1-201; Online available at <http://www.law.cornell.edu/ucc/1/1-201.html> (Date accessed 17/06/2002).

[441] See UCC *Ibid.*

[442] See Black's Law Dictionary, *supra* 101; *Pacta sunt servanda*: "Agreements must be kept. The rule that agreements and stipulations, esp. those contained in treaties, must be observed." Also see Article 26 of the Vienna Convention 1969, *supra* 106.

[443] G. H. Treitel, *The Law of Contract*, (London: 10th Ed. Sweet & Maxwell - 1999); p. 538: "The doctrine of privity means that a person cannot acquire rights or be subject to liabilities arising under a contract to which he is not a party. It does not mean that a contract between A and B cannot affect the legal rights of C indirectly." Also see Black's Law Dictionary, *supra* 101; Privity of contract: "The relationship between the parties to a contract, allowing them to sue each other but preventing a third party from doing so."

[444] See Kayser, *supra* 76, p. 151.

- The good faith of the breaching party. As defined by the U.S. Uniform Commercial Code "every contract or duty within this Act imposes an obligation of good faith in its performance or enforcement."[445]

Only a complete or major breach will justify a claim for damages or a termination of the contract, while in the case of a minor breach, the offender will still have to perform its duties under the contract.[446]

One issue that is important here is that of warranties under the contract. These contractual warranties may be express or implied. As also defined by the UCC in Article 2-313, an express warranty is an affirmation by the seller relating to the goods that becomes part of the contract.[447] It is important to note how in paragraph 2 of the Article, there is not a need for formality in order to establish such a warranty. Implied warranties are also defined by the UCC in Article 2-314.[448] We can also find a definition of express and implied warranty under the U.S. Code.[449] Article 2-315[450] is very important in

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[445] See US UCC, Article 1-203. *Supra* 440.

[446] See Kayser, *supra* 76, p. 151.

[447] See US UCC, Article 2-313: "Express Warranties by Affirmation, Promise, Description, Sample.
(1) Express warranties by the seller are created as follows:
(a) Any affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain creates an express warranty that the goods shall conform to the affirmation or promise. (b) Any description of the goods which is made part of the basis of the bargain creates an express warranty that the goods shall conform to the description. (c) Any sample or model which is made part of the basis of the bargain creates an express warranty that the whole of the goods shall conform to the sample or model. (2) It is not necessary to the creation of an express warranty that the seller use formal words such as "warrant" or "guarantee" or that he have a specific intention to make a warranty, but an affirmation merely of the value of the goods or a statement purporting to be merely the seller's opinion or commendation of the goods does not create a warranty." *Supra* 440.

[448] See US UCC; 2-314: "Implied Warranty: Merchantability; Usage of Trade.
(1) Unless excluded or modified (Section 2-316), a warranty that the goods shall be merchantable is implied in a contract for their sale if the seller is a merchant with respect to goods of that kind. Under this section the serving for value of food or drink to be consumed either on the premises or elsewhere is a sale.
(2) Goods to be merchantable must be at least such as (a) pass without objection in the trade under the contract description; and (b) in the case of fungible goods, are of fair average quality within the description; and (c) are fit for the ordinary purposes for which such goods are used; and (d) run, within the variations permitted by the agreement, of even kind, quality and quantity within each unit and among all units involved; and (e) are adequately contained, packaged, and labelled as the agreement may require; and (f) conform to the promise or affirmations of fact made on the container or label if any.
(3) Unless excluded or modified (Section 2-316) other implied warranties may arise from course of dealing or usage of trade." *Supra* 440.

[449] See US Code, Title 15 Chapter 50, section 2301: "The term "written warranty" means - (A) any written affirmation of fact or written promise made in connection with the sale of a consumer product by a supplier to a buyer which relates to the nature of the material or workmanship and affirms or promises that such material or workmanship is defect free or will meet a specified level of performance over a specified period of time, or (B) any undertaking in writing in connection with the sale by a supplier of a consumer product to refund, repair, replace, or take other remedial action with respect to such product in the event that such

relation to implied warranties, as it introduces the concept of 'Fitness for Particular Purpose',[451] which may be of special importance in the case of space activities, as the buyer will rely on the seller's skills "to select or furnish suitable goods", so that there automatically appears an implied guarantee "that the goods shall be fit for such purpose",[452] unless otherwise expressly agreed.

These express and implied warranties may be of quite significant importance when dealing with satellites, but especially when dealing with receivers, due to a market that arguably extends the risk of accident not only to the users but also to third parties. For this reason it is also noteworthy that Article 2-318 extends the scope of applicability of the warranties to third parties, and precludes the seller from limiting or excluding the warranties when dealing with injured third parties under Article 2-318[453] and as an exemption to the 'privity of contract' principle. Finally, Article 1-107 allows limiting the buyers' rights, if expressly agreed, through a "Waiver or Renunciation of Claim or Right After Breach."[454] Case law has also played an important role in the matter. For instance, in *Henningen v. Bloomfield Motors,* 1960, the Supreme Court of New Jersey confirmed

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product fails to meet the specifications set forth in the undertaking, which written affirmation, promise, or undertaking becomes part of the basis of the bargain between a supplier and a buyer for purposes other than resale of such product. (7) The term "implied warranty" means an implied warranty arising under State law (as modified by sections 2308 and 2304(a) of this title) in connection with the sale by a supplier of a consumer product." See *supra* 37.

[450] US UCC, Article 2-315. "Implied Warranty: Fitness for Particular Purpose.
Where the seller at the time of contracting has reason to know any particular purpose for which the goods are required and that the buyer is relying on the seller's skill or judgment to select or furnish suitable goods, there is unless excluded or modified under the next section an implied warranty that the goods shall be fit for such purpose." *Supra* 440.

[451] See US UCC *ibid.*

[452] See US UCC *ibid.*

[453] See US UCC, Article 2-318: "Third Party Beneficiaries of Warranties Express or Implied." "Alternative A: A seller's warranty whether express or implied extends to any natural person who is in the family or household of his buyer or who is a guest in his home if it is reasonable to expect that such person may use, consume or be affected by the goods and who is injured in person by breach of the warranty. A seller may not exclude or limit the operation of this section. Alternative B: A seller's warranty whether express or implied extends to any natural person who may reasonably be expected to use, consume or be affected by the goods and who is injured in person by breach of the warranty. A seller may not exclude or limit the operation of this section. Alternative C: A seller's warranty whether express or implied extends to any person who may reasonably be expected to use, consume or be affected by the goods and who is injured by breach of the warranty. A seller may not exclude or limit the operation of this section with respect to injury to the person of an individual to whom the warranty extends." *Supra* 440.

[454] See US UCC, Article 1-107: "Any claim or right arising out of an alleged breach can be discharge in whole or in part without consideration by a written waiver or renunciation signed and delivered by the aggrieved party." *Supra* 440.

that in the case of a sale of goods by description, an "implied warranty will be an integral part of the transaction".[455] The court also stated that an express warranty is not inconsistent with an implied one,[456] and extended the implied warranty of fitness for a particular purpose out of privity of contract.[457] The *rationale* for that is equally found in the decision of the court, as warranties have their origin in the safeguard of the consumer.[458] Therefore, limiting these warranties must be done with precaution, as although it is highly important to preserve the liberty of contracts, equally important is to prevent its abuse.[459] Finally, the court also affirmed that implies warranties arising from sale are a matter of law.[460]

Interpretation of contracts is a matter of major importance. One of the key rules is also provided by the UCC, in its Article 2-202,[461] according to which the terms of the writing may not be varied or contradicted by evidence, or any other agreement, in the absence of fraud, coercion or mutual mistake.

Besides this important rule, the UCC also provides for a second interpretative rule in its Article 1-205, which affirms that previous practice between the contracting parties, the general practice of the parties and contracting customs in the location where the contract is made, may also be taken into account when interpreting the terms of the agreement.[462] Apart from this, there are some other principles of interpretation that courts apply, such as the following:[463]

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[455] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 370 (N.J. 1960).
[456] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 378 (N.J. 1960).
[457] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 383 (N.J. 1960).
[458] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 382 (N.J. 1960).
[459] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 388 (N.J. 1960).
[460] *Henningen v. Bloomfield Motors* 161 A. 2d 69, 408 (N.J. 1960).
[461] See US UCC, Article 2-202: "Final Written Expression: Parol or Extrinsic Evidence Terms with respect to which the confirmator, see; by memoranda of the parties agree or which are otherwise set forth in a writing intended by the parties as a final expression of their agreement with respect to such terms as are included therein may not be contradicted by evidence of any prior agreement or of a contemporaneous oral agreement but may be explained or supplemented (a) by course of dealing or usage of trade (Section 1-205) or by course of performance (Section 2-208); and (b) by evidence of consistent additional terms unless the court finds the writing to have been intended also as a complete and exclusive statement of the terms of the agreement." *Supra* 440.
[462] See US UCC, Article 1-205: "Course of Dealing and Usage of Trade: (1) A course of dealing is a sequence of previous conduct between the parties to a particular transaction which is fairly to be regarded as establishing a common basis of understanding for interpreting their expressions and other conduct. (2) A usage of trade is any practice or method of dealing having such regularity of observance in a place, vocation

- The primary purpose of the parties shall be taken into account when interpreting an agreemet;[464]
- Unclear or ambiguous terms usually are construed against the drafter of the text,[465] or against the strongest party;

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or trade as to justify an expectation that it will be observed with respect to the transaction in question. The existence and scope of such a usage are to be proved as facts. If it is established that such a usage is embodied in a written trade code or similar writing the interpretation of the writing is for the court. (3) A course of dealing between parties and any usage of trade in the vocation or trade in which they are engaged or of which they are or should be aware give particular meaning to and supplement or qualify terms of an agreement. (4) The express terms of an agreement and an applicable course of dealing or usage of trade shall be construed wherever reasonable as consistent with each other; but when such construction is unreasonable express terms control both course of dealing and usage of trade and course of dealing controls usage of trade. (5) An applicable usage of trade in the place where any part of performance is to occur shall be used in interpreting the agreement as to that part of the performance. (6) Evidence of a relevant usage of trade offered by one party is not admissible unless and until he has given the other party such notice as the court finds sufficient to prevent unfair surprise to the latter." *Supra* 440.

[463] See Kayser, *supra* 76, p. 152 and 154.

[464] US DoJ Civil Resource Manual 72, Principles of Contract Interpretation: "Contract interpretation begins with the plain language of the contract. *Gould, Inc. v. United States*, 935 F.2d 1271, 1274 (Fed. Cir. 1991); accord *Hol-Gar Mfg. Corp. v. United States*, 169 Ct. Cl. 384, 390 (1965). A court should first employ a "plain meaning" analysis in any contract dispute. *Aleman Food Services, Inc. v. United States*, 994 F.2d 819, 822 (Fed. Cir. 1993). In construing the terms of a contract, the parties' intent must be gathered from the instrument as a whole in an attempt to glean the meaning of terms within the contract's intended context. Kenneth *Reed Constr. Corp. v. United States*, 475 F.2d 583, 586 (Ct. Cl. 1973); *Tilley Constructors v. United States*, 15 Cl. Ct. 559, 562 (1988). The intention of the parties to a contract controls its interpretation. Firestone *Tire & Rubber Co. v. United States*, 444 F.2d 547, 551 (Ct. Cl. 1971). Contract interpretation requires examination first of the four corners of the written instrument to determine the intent of the parties. Hol-Gar Mfg. Corp. v. United States, 351 F.2d 972 (Ct. Cl. 1965). An interpretation will be rejected if it leaves portions of the contract language useless, inexplicable, inoperative, meaningless, or superfluous. *Ball State Univ. v. United States*, 488 F.2d 1014 (Ct. Cl. 1973); *Blake Constr. Co. Inc. v. United States*, 987 F.2d 743, 746-47 (Fed. Cir. 1993)." Online available at the US DoJ website <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00072.htm> (November 1998) (Date accessed 17/06/2002).

[465] See US DoJ Civil Resource Manual 73, Ambiguities: "Ambiguity in a contract may be either latent or patent. If a contract is reasonably, but not obviously, susceptible of more than one interpretation, it is latently ambiguous. Hills Materials Co. v. Rice, 982 F.2d 514, 516 (Fed. Cir. 1992). A latent ambiguity will be construed against the drafter if the *nondrafter's interpretation is reasonable. Hills Materials Co. 982 F.2d at 516, citing Fort* Vancouver Plywood Co. v. United States, 860 F.2d 409, 414 (Fed. Cir. 1988). Whether an interpretation is reasonable will be determined by ordinary principles of contract construction. A patent ambiguity is an obvious error, or gross discrepancy, or an inadvertent, but glaring gap. *H.B. Zachry Co. v. United States*, 28 Fed. Cl. 77, 81 (1993), aff'd 17 F.3d 1443 (Fed. Cir. 1994), citing *Interstate General Government Contractors v. Stone*, 980 F.2d 1433, 1435 (Fed. Cir. 1992). Where a patent ambiguity exists, a contractor is under a duty to attempt to resolve the ambiguity prior to bidding if the contractor subsequently wishes to rely upon the provision. E.g., S.O.G. of *Arkansas v. United States*, 546 F.2d 367, 369 (Ct. Cl. 1976). In such circumstances, the obviousness of the discrepancy is critical, not the actual knowledge of the contractor. *Chris Berg, Inc. v. United States*, 455 F.2d 1037, 1045 (Ct. Cl. 1972). Failure by a bidder to seek a clarification of a patent ambiguity prior to submitting its bid precludes that bidder from later recovering for work that it reasonably, but wrongly, believed was not required by the contract. *Tilley Constructors & Engineers, Inc. v. United States, supra.*" Online available at the US DoJ website <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00073.htm> (November 1998) (Date accessed 17/06/2002).

- The courts will try to interpret contractual terms so that they have a reasonable, lawful and effective meaning;
- Specific terms will prevail over general terms.

A special clause that is commonly seen in space contracts is the 'best efforts clause',[466] which contains aspects of waiver of guarantees and/or liability. Although it is more common to find these clauses in launching contracts,[467] they may also be found in satellite manufacturing contracts. This best-efforts concept has been defined as "the fulfilment of the contractual obligations [that] shall be according to the highest standards of quality."[468] It has two main characteristics: it waives guarantees and liability and it provides an enhanced promise of performance.[469] Although it may waive liability or guarantees, it is important to remember that such a limitation of contractual liability or of guarantees does not extend to damage caused to third parties, as we have seen under the UCC.[470]

2.2 *Liability in Tort: Negligence And Strict Liability. Product Liability Law in the U.S.*

Liability in tort deals with damage caused outside a contractual relationship. Such damage would be caused, *e.g.*, by a private GNSS service operator against third parties due to a bad service. Another example could be of a bystander that suffers damage due to an accident caused as a result of a malfunctioning GNSS satellite or receiver. Under product liability, the liability of the manufacturer of the satellite, as well as the liability of the GNSS receiver producer, will be analyzed.

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[466] See Black's Law Dictionary, Best effort contracts: " A contract in which a party undertakes to use best efforts to fulfill the promises made; a contract in which the adequacy of a party's performance is measured by the party's ability to fulfill the specified obligations. Although the obligor must use best efforts, the risk of failure lies with the obligee. To be enforceable, a best- efforts term must generally set some kind of goal or guideline against which the efforts may be measured." *Supra* 101.
[467] M. Couston, *Droit Spatial Économique. Régimes applicables a l'exploitation de l'espace*, (Paris: SIDES, 1994), p. 200.
[468] B. Schmid-Tedd "Best efforts principle and terms of contract in space business" Proceedings of the 31st IISL Colloquium on the Law of Outer Space (1988), p. 336.
[469] See Schmid-Tedd, p. 330; *ibid.*
[470] See US UCC, *supra* 440.

a) Negligence

Negligence is defined in the Restatement (Second) of Torts as "conduct that falls below the standard established by law for the protection of others against unreasonable risk of harm."[471] However, the standard of care for space activities has not yet been legally established. Nevertheless, some clues may be deduced from international and national legislations. The 'almost-absolute'[472] liability regime established in the Liability Convention of 1972 is a clear manifestation of the high standard of care imposed upon States for space activities, as already studied, and this standard finds reflection in in the domestic space laws of the different States:[473] the standard of care and conduct needed to avoid negligence is that expected of a 'reasonable man under like circumstances.'[474] Under a high-standard regime, like the one applying to space endeavours, a minor breach of the said standard will result in negligence.

To show negligence, the claimant must demonstrate the duty of care, the act or omission breaching the duty of care, the causal link between the act or omission and the damage incurred and finally the damage suffered. The origin of these requirements is found in case law. One of the basic cases here is *Donoghue v. Stevenson*,[475] 1932, which established that the duty of care could exist independent of contract, and pointed out the special duty to take precautions. Another important case is *McPherson v. Buick* of 1916, where it was established that the more probable the danger, the greater the need for caution,[476] and also confirmed liability irrespective of privity of contract, as the court in *Manos v. Transworld Airlines*, 1971,[477] also did.

Despite this high standard of care imposed for space activities, tort cases will not generally be the best way for a victim to raise a claim, as the injured party will, in

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[471] See the Restatement (2nd) of Torts, section 282. *Supra* 385.
[472] J. Rajski, "Convention on International Damage caused by space Objects. An important step in the development of the international space law. " Proceedings of the 17th IISL Colloquium on the Law of Outer Space of the IAF (1974), p. 254.
[473] Just as an example, Article 25 of the Russian Federation Law on Space Activities of 1993, asks for "compulsory insurance coverage", which is a reflection of the high risk involving space activities and is an example of the high standard of care impose upon them, see *infra* 688.
[474] See the Restatement (2nd) of Torts section 283, *supra* 385.
[475] *Donoghue v. Stevenson*, in Weber & Grossman, *supra* 325, p. 361.
[476] *McPherson v. Buick* 217 N.Y. 382, 395 (1916): "The more probable the danger, the greater the need of caution."
[477] See Weber & Grossman, *supra* 325, p. 526.

principle, carry the burden of proof.[478] However, this burden may be lessened by the rule of *res ipsa loquitur*,[479] which will result in the reversion of the burden of proof if a) injury is not expected in the absence of negligence, b) the object causing damage was under the entire control of the defendant, and c) there is no contributory negligence on the side of the claimant.[480] Nevertheless, this *res ipsa loquitur* theory, which was developed to protect users, relies on a reasonably knowledgably experience of the activity or object on the part of the defendant through which damage was caused. Therefore, it may be too early to be applied to some space-related cases.[481]

b) Strict liability

A defect in a product may cause damage to the buyer, and likewise a defective service may also result in damage or injury. The product liability perspective of the matter will be leaft aside, as it will be covered in the next paragraph, and attention will focuse now on strict liability imposed on the undertaking of dangerous activities.

The principle of strict liability for hazardous activities, as set forth in *Rylands v. Fletcher*[482] and slightly modified in the Restatement (2nd) of Torts, provides us with guidance when affirming that the person who "carries on an ultra-hazardous activity is liable to another person" if damage is foreseable, "although the utmost care is exercised to prevent the harm."[483] Such ultra-hazardous activities are defined in the Restatement as those that involve "necessarily a risk of serious harm to the person, land or chattels of

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[478] In general tort law, the burden of proof usually is on the side of the claimant.

[479] *Lux Art Van Service, Inc. v. Pollard,* 344 F.2d 883 (C.A. Ariz. 1965): "Under "*res ipsa loquitur*" doctrine, when a thing which causes injury, without fault of injured person, is shown to be under exclusive control of defendant, and injury is such as in ordinary course of things does not occur if the one having such control uses proper care, it affords reasonable evidence, in absence of an explanation, that injury arose from defendant's want of care."

[480] *Johnson v. Coca Cola Bottling Co. of Willmar*, 235 Minn. 47, 476 (MINN. 1952.): "Three requirements for the application of the doctrine under our decisions do not differ from those stated by Professor Prosser in 20 Minn.L.Rev. 241, as suggested by Dean Wigmore in 5 Wigmore, Evidence (2 ed.) s 2509, p. 498. See, 9 Id. (3 ed.) s 2509, p. 391. They are as follows: (1) Plaintiff must have been injured by an apparatus or instrumentality whose nature is such that injury is not ordinarily to be expected in the absence of negligence; (2) at the time of the injury, both inspection and user must have been in the exclusive control of the defendant; and (3) the injurious condition or occurrence must not have been due to any voluntary action on the part of plaintiff. Risberg v. Duluth, M. & I.R. Ry. Co. *supra*."

[481] See *Smith v Lockheed Martin*, *infra* 485.

[482] See Bosco, *supra* 374, p. 261, *Ryland v. Fletcher* 3 L.R.E. & I App. 330 (House of Lords 1868).

[483] See Restatement (2nd) of Torts sections 519,520, *supra* 385.

others that cannot be eliminated by the exercise of the utmost care and is not a matter of common usage."[484]

I believe that space activities do qualify as hazardous endeavours within the context of the Restatement (Second) of Torts. Additionally, GNSS seems also to be an ultra-hazardous activity, as risks such as jamming, unintentional interference, or satellite failure or collision resulting in the loss of the signals, as well as the incapability of the available systems to duly warn in case of a signal outage, are all evidence of the ultra-hazardous nature of space, and specifically of GNSS, activities. The 'serious harm' that such events would cause, quite obviously in relation to property or chattels and even persons, justifies the applicability of strict liability to space activities and GNSS. Courts, in cases such as *Smith v. Lockheed Propulsion Co.*[485] and *Martin Berg. V. Reaction Motors Div.*,[486] have held that rocket activities are ultra-hazardous ones and should be subject to this strict liability doctrine.[487] J. A. Bosco compares such rocket activities to

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[484] See Restatement (2nd) of Torts, *ibid.*

[485] *Smith v. Lockheed Propulsion Co.* 247 Cal.App.2d 774, 785-786: "In our opinion, defendant's activity must be classed as ultrahazardous [...] Whether an activity is ultrahazardous is a question of law to be determined by the court. (*Luthringer v. Moore, supra,* at page 496; *Beck v. Bel Air Properties, Inc., supra,* at page 842; Rest., Torts, § 520, com. h). [...] Defendant, who is engaged in the enterprise for profit, is in a position best able to administer the loss so that it will ultimately be borne by the public. As Professor Prosser summarizes the rationale for the imposition of strict liability: "The problem is dealt with as one of allocating a more or less inevitable loss to be charged against a complex and dangerous civilization, and liability is placed upon the party best able to shoulder it." (Prosser, Law of Torts, (2d ed. 1955) page 318). The precise issue before us-whether rocket motor testing constitutes an ultrahazardous activity - was squarely considered and answered affirmatively in *Berg v. Reaction Motors Div.* (1962) 37 N.J. 396 [181 A.2d 487]". Also see S. Gorove "Cases on Space Law. Texts, comments and references" Journal of Space Law, University of Mississippi (1996), p. 27.

[486] *Berg v. Reaction Motors Division, Thiokol Chemical Corp.* 37 N.J. 396, 410: "[...] although careful blasting may not involve an unreasonable risk of harm and should therefore not be entirely prohibited, it nonetheless is an ultrahazardous activity which introduces an unusual danger into the community and should pay its own way in the event it actually causes damage to others. [...] A business enterprise which engages in blasting operations knows that despite the precautions it takes, neighboring properties may be damaged. If damage does occur, it should in all fairness be absorbed as an operating business expense, for the enterprise may not reasonably expect it wholly innocent neighbors to shoulder the loss. It seems to us that the foregoing considerations apply with even greater force to the case at hand. The extraordinary activities of the defendant may readily be classed as ultrahazardous and, unlike the situation in many of the blasting cases, the significant structural damage resulted from their continuation after receipt of repeated complaints from the neighboring landowners. See Freedman, 'Nuisance, Ultrahazardous Activities, and The Atomic Reactor,' 30 Temp.L.Q. 77, 90--104 (1957); cf. Keeton, supra, 59 Colum.L.Rev. at p. 470."

[487] An exception is found in *Pigott v. Co.* 240 So.2d 63 (Miss. 1970), 63-64: "Neither Constitution nor laws of state impose liability on contractor who performs a lawful public function without negligence; the remedy, if any, for consequential damages being against the public agency having the work done. Const.1890, § 17 [...]The decisive question, one of several affirmative defenses raised by Boeing, is whether a contractor engaged in performing a lawfully authorized public function of the United States Government in accordance with a public contract is liable for damages to private property in the absence of

space launching ones, and extends stric liability to outer space activity in general, following the subsequent reasoning:

> Outer space activity is not an activity which can as yet be considered 'commonly carried on'; there exists a high degree of risk of harm to person, land, or chattels of others if there is an accident; it is likely that is there is any harm which results, the harm will be great.[488]

Nevertheless, courts are the ultimate interpreters of the law in a given case, so an activity that now may be considered ultra-hazardous in given jurisdiction, may not found to be so in the near future or *viceversa*. Such may be the case for space activities, and perhaps more likely, for GNSS activities.

c) Product Liability

Product liability is linked to damage c reated by a defective product sold in the market. The first question that comes into view is whether liability arising from a defective product comes under contract law. Product liability has elements of both contract and extracontractual law, although typically there is no contract between the parties. The contractual side would be ruled by contract law – *e.g.* a contract of sale or services between the company and the provider of the receiver or the signal-, the latter already analyzed above. Product liability particularly deals with physical harm to persons or property, and would cover even those cases without a contractual link to the manufacturer of the defective product.

Establishing whether the failure of GNSS signals (due to malfunction of the satellite) falls under the scope of product liability is a matter of causality and proof to be determined by the courts. A satellite, as a product, should be subject to the product

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the contractor's negligence. In our opinion this question is answered by Curtis v. Mississippi State Highway Comm'n and Continental, Inc., 195 So.2d 497 (Miss.1967). The Court held that the contractor was not liable for damages resulting from the contractor's execution of the work of constructing a highway in accordance with the plans and specifications and under the direction of the state highway engineers if such improvement was made without negligence. [...]We do not reach the question of the liability of the United States or whether, if the United States is immune from suit, Boeing can claim such immunity. We rest our decision on the proposition that a contractor lawfully acting in behalf of the United States in performing a lawful public function without negligence is not liable for consequential damages resulting therefrom." Also See Gorove *supra* 485, p. 38.

[488] See Bosco, *supra* 374, p. 270.

liability theory, provided that there is no 'best efforts' clause in the contract.[489] Nevertheless this is not really a problem as best efforts clauses are applicable only between the contractual parties, and we must not forget, in addition, that 'best efforts' clauses, as any clause that limits or waives liability, cannot waive liability for bodily injuries, and are strictly applied by courts in the light of privity of the contract. The 'component parts' of the satellite would also fall under the scope of applicability of product liability, irrespective of the satellite contract of sale and its 'best efforts' clauses. Therefore, as noted by the Restatement (Third) of Torts, it is important to take product liability into account when dealing not only with receivers, but also with satellites or their component parts, as any member of the distribution or production chain may be held jointly and severally liable for the entire extent of damage, as each is earning a profit from the marketing and selling of the final product.[490]

Product liability is also defined by the Restatement (Second) of Torts as the,

> Special liability of the seller of the product for physical harm to user or consumer. (1) One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if a) the seller is engaged in the business of selling such a product; b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold. (2) The rule in Subsection (1) applies although a) the seller has exercised all possible care in the preparation and sale of his product, and b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.[491]

The Restatement (Third) of Torts of 1997[492] addresses one of the major shortcomings of the Restatement (Second) of Torts -which had dominated "for more than

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[489] Best efforts clauses, see *supra* 466.

[490] Restatement of the Law Third, Torts. The American Law Institute, (St. Paul, MN: American Law Institute Publishers, 1998) [Hereinafter Restatement (Third) of Torts]. Section 5, providing the liability of commercial seller or distributor of products components for harm caused by products into which components are integrated: "One engaged in the business of selling or otherwise distributing product components who sells or distributes a component is subject to liability for harm to persons or property caused by a product into which the component is integrated if: a) the component is defective in itself, as defined in this Chapter, and the defect causes harm; or b) 1) the seller or distributor of the component substantially participates in the integration of the component into the design of the product; and 2) the integration of the component causes the product to be defective, as defined in this Chapter and 3) the defect in the product causes harm."; Also see, N. M. Matte "Special Aspects of Product Liability in Relation to Space Transportation", Proceedings of an international Colloquium in Cologne 1977, Carl Heimanns Verlag K.G. (1978), p. 182.

[491] See the Restatement (2nd) of Torts section 402 A , *supra* 389.

[492] J.D. Shupe and T. R. Steggerda "Toward a more uniform and 'reasonable' approach to products liability litigation: current trends in the adoption of the restatement (third) and its potential impact on aviation

30 years the landscape of product liability"-[493] by widening the notion of defects as follows: "Abundant authority recognizes the division of product defects into manufacturing defects, design defects, and defects based on inadequate instructions or warnings."[494] Professor Matte has also defined Product Liability as

> The liability of the manufacturer of a finished product, of a component part, or of the producer of a natural product, *and of the persons engaged in the supply and distribution*, for damages which arise from the use of defective products.[495]

The landmark cases about the theory of product liability are *McPherson v. Buick Motor*[496] and *Henningen v. Bloomfield Motors*,[497] which have also widened the product liability theory to include persons other than the purchaser.[498] Some additional important cases are the well known *Greenman v. Yuba Power*[499] of 1962, which stated that the purpose of strict liability in tort is to ensure that the costs of injuries resulting from the defective product are borne by the manufacturer that places the product in the market;[500] and *Fluor Corp. v. Jeppensen*[501] case of 1985, which broadened the concept of defect and also affirmed that once a plaintiff makes a "*prima facie* showing of proximate cause, the burden of proof shifts to the defendant to prove that the product is not defective."[502]

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litigation." JALC Vol. 66 2000: "Despite its infancy, the Restatement (Third) already is being woven into the fabric of products liability law of many [US] states [...]" and the Restatement (Third) has been "cited in significant fashion by twenty of the highest courts in the [US] states at the time of this Article's preparation [...] also by many federal courts, including the United States Supreme Court. See, eg., Geier v. American Honda motor Co., 120 S. Ct. 1913 (2000)", p. 144 and 145; Also see For all cases where the Restatements have been cited in the past years, see *The American Law Institute, Torts 3d – Products Liability Cumulative Annual Supplement. For use in 2002*. Reporting Cases from July 1984 Through June 2001that cite the Restatement of the Law Second, Torts 2d sect. 402A and 402B and Restatement of the Law Third, Torts: Product Liability Article 1 to End. (American Law Institute Publishers - 2002).

[493] R. T. Rutherford "Changes in the landscape of products liability law: an analysis of the restatement (third) of Torts", JALC, Vol. 63 (1997-1998) at 210. Furthermore the author points out that: "In 1994 the American Law Institute acknowledge that 402A was out of date [...]", p. 211.

[494] See Restatement (Third) of Torts of 1997, *supra* 490.

[495] See Matte, *supra* 490 [Emphasis added].

[496] *McPherson v. Buick Motor Co.* 217 N.Y. 382 (N.Y. 1912).

[497] *Henningen v. Bloomfield Motors*, see *supra* 455.

[498] *McPherson v. Buick Motor Co.* 217 N.Y. 382, 388.

[499] *Greenman v. Yuba Power* 377 P. 2d 897 (CAL. 1963).

[500] *Greenman v. Yuba Power* 377 P. 2d 897, 62.

[501] *Fluor Corp. v. Jeppensen & Co.* 170 Cal. App.3d (CAL. 1985).

[502] *Fluor Corp. v. Jeppensen & Co.*, 170 Cal. App.3d, 478.

From a careful reading of these cases,[503] it may be established that the elements the plaintiff will have to prove so as to can obtain compensation from the manufacturer, are the following:

- The defective condition of the product (several courts have sustained the proof of a defect only by circumstantial evidence[504]);
- The proximate cause of the injuries or damage was the defective condition of the product;
- The actual loss or damage borne;
- The existence of the defect at the time the product left the defendant's control;
- The placement of the product in the market by the defendant.

Categories of product defects found to exist by the Courts, and established by the Restatement (Third) of Torts, can be summarized as follows:

- Defective products, as a result of a failure to build products properly: although the design is correct the product "departs from its intended design even though all possible care was exercised in the preparation and marketing of the product."[505]
- Design defects: the complete series of products will be defective as there is a deficiency in the origin of the product. A design defect is applicable when "the foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product not reasonably safe".[506]
- Failure to warn, or to provide instructions about the hazardous nature of the product. The manufacturer must provide specific instructions and warnings.[507]

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[503] Also important is Swain v. Boeing Airplane Co, 337 F.2d 940, 942 (C.A.N.Y. 1964).

[504] *Bell Aerospace Corp. v. Anderson*, 478 S.W. 2d 191, 197 (TEX. 1972).

[505] See Restatement (Third) of Torts, section 1: "Liability of Commercial Seller or Distributor for harm caused by defective products: One engaged in the business of selling or otherwise distributing products who sells or distributes a defective product is subject to liability for harm to persons or property caused by the defect." See also section 2, *supra* 490.

[506] See Restatement (Third) of Torts, section 2 dealing with categories of product defect mentions "manufacturing defect", "defective in design", "defective because inadequate instructions or warnings."

[507] See Restatement (Third) of Torts, section 2, *supra* 490; Also see *Stevens v. Cessna Aircraft Co.* 115 Cal.App.3d 431, 433 (California 1981): "A product may be defective if inadequate warning is given to the consumer."; also *Nesselrode v. Executive Beechcraft*, 707 S.W.2d 371, 382 (Mo. 1986) "A product may be rendered unreasonably dangerous because of the absence of a warning concerning use or misuse, or

The breach of this duty may also lead to the imposition of punitive damages on the side of the manufacturer.[508]

- Inadequate product observation and monitoring: the manufacturer is under a duty to keep track of the product and in case of hazards, to communicate them to other buyers.[509]
- Breach of standards flowing from governmental regulations, those imposed by law,[510] and those constituting part of the 'professional standards' of the working staff, which will be the standard determined by each professional activity (as an example, this would refer as the professional standard of an aeronautical engineer properly educated, trained and experienced).
- Failure to macth the current 'State of the art',[511] matching the 'state of the art' means producing the object within the scientific and technical knowledge existing at the time the product -the satellite or receiver- is assembled. This concept must be flexible from an economic point of view, which means that the manufacturing process of the product must be reasonably viable.

I would also like to comment here on the applicability of strict product liability to *aeronautical chart publishers*, as an analogy to the software-charts that work together with GNSS positioning signals, specially in the automobile and aviation industries, and

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deficient warning."; Finally also see *Sage v. Fairchild-Swearingen Corporation,* 70 N.Y.2d 579 (C.A. N. Y. 1987).

[508] See G. M. Moore and J. D. Caven, *supra* 17, p. 711.

[509] Restatement (Third) of Torts section 10, a post sale duty to warn exists if the following four conditions are met: "1) the seller knows or reasonably should know that the product poses a substantial risk of harm to persons or property; 2) those to whom a warning might be provided can be identified and can reasonably be assumed to be unaware of the risk of any harm; 3) a warning can be effectively communicated to and acted on by those to whom a warning might be provided; and 4) the risk of harm is sufficiently great to justify the burden of providing a warning." *Supra* 490.

[510] Restatement (Third) of Torts section 4: In connection with liability for defective design or inadequate instructions or warnings: a) a product's non-compliance with an applicable product safety statute or administrative regulation renders the product defective with respect to the risks sought to be reduced by the statute or regulation; and b) a product's compliance with an applicable product safety statute or administrative regulation is properly considered in determining whether the product is defective with respect to the risks sought to be reduced by the statute or regulation, but such compliance does not preclude as a matter of law a finding of product defect." *Supra* 490. Also see the case *Anns and others v. London Borough of Merron*, England (1977) see Weber & Grossman *supra* 325, p. 237, introducing a minimum care doctrine established by law.

[511] To some extent identifiable under section 2 (b) of the Restatement (Third) of Torts, reasonability of an "alternative design." See *supra* 490.

also as an analogy to the information that appears on the screen of a GNSS receiver, which, to certain extent, makes the functions of a traditional charter.

For example, in the case of aviation, the U.S. Federal Aviation Administration[512] does not require pilots to have any particular charter,[513] but requires them to have the necessary information whatever form is most efficient.[514] Therefore, it may not be too outrageous to think that electronic means of positioning and navigation may be regarded as aeronautical charters for information and data purposes. Were an aeronautical charter - and the information contained- be considered as a product, the publishers -of the charter, or of the software or even the providers of the GNSS signal- could be held strict liable under product liability for the erroneous data and information provided and for the injuries caused. The defective information in a charter may be: 1) Accurate but misleading, when the information is correct, but the graphic display mislead the pilot to interpret erroneously the data;[515] 2) Accurate but dangerous, here the path or procedure

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[512] US Federal Aviation Administration [Hereinafter FAA] online at <www.faa.gov> (Date accessed 20/06/2002).

[513] FAA Regulations § 91.103 "Preflight action. Each pilot in command shall, before beginning a flight, become familiar with *all available information concerning that flight.* This information must include --
(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC; (b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:
(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and (2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature." Online available at the FAA <http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/14cfr91_00.html> (Last updated 18/06/2002, date accessed 20/06/2002); Further information on Aeronautical Charters may be obtained in Chapter 9 Aeronautical Charts and Related Publications at <http://www.faa.gov/ATpubs/AIM/chap9toc.htm> (Last updated 21/ 02/2002 and Date accessed 20/06/2002).

[514] R. B. Schultz "Application of strict product liability to aeronautical cart publishers" JALC, Vol. 64 (1998/1999), p. 435 *et seq.*

[515] *Aetna Casualty and Surety Corp. v. Jeppesen and Co.* 642 F.2d 339, 342 (C.A.NEV. 1981): "The theory of Aetna was that the crash was due to pilot reliance on this faulty assumption, invited by the difference in scale. It contends that this difference in scale created a conflict between the information conveyed by the graphics of the chart and that conveyed in words and numbers, and that this conflict rendered the chart defective." *Fluor Corp. v. Jeppesen* 170 Cal.App.3d 468, 216 Cal. Rptr. 68: "Product is defective in design either if product has failed to perform as safely as ordinary consumer would expect when used in intended or reasonably foreseeable manner, or if, in light of certain relevant factors, benefits of challenged design do not outweigh risk of danger inherent in such design." And also in 170 Cal.App.3d 468, 216, 474: "No California court has yet decided whether charts of the type manufactured by respondent may be deemed to constitute "products" for purposes of determining the applicability of strict liability principles. However, they were expressly so classified in decisions filed by two different districts of the United States Courts of Appeal after the trial in the instant case had been concluded." Also see *Brocklesby v. United States* (9th

designated by the authorities was not the most appropriate one and was, in fact, dangerous;[516] and 3) Simply inaccurate.[517]

The following cases dealt with aeronautic charter publishers and up to date there has been no cases alleging strict product liability against aeronautical *electronic* charters[518]. From all these cases, important is to note that in the *Fluor* case the Court found that strict liability applied to protect vulnerable victims, and that there could be perceived lethal potential errors on the charters.[519] Also in the *Saloomey* case, the Court affirmed that a "[...] portrayal of Federal Aviation Administration flight data on its charts is a 'product' for strict liability issues."[520] Nevertheless the word 'product' in terms of product liability seems to comprise just the "tangible world."[521] The Restatement (Third) of Torts defines 'product' in its section 19 as a "tangible personal property distributed commercially for use or consumption", but remarks that under certain conditions "other items, such as real property and electricity are products [...]".[522] In commentary *(d)* to section 19 of the Restatement (Third) of Torts, regarding intangible personal property, the American Law Institute affirms that some courts refuse to apply product liability to the information contained in books or maps due to the believe that it would significantly impinge on free speech. Nevertheless the Institute also affirms that "some Courts have imposed strict product liability in maps and navigations charts [...]".[523]

In my opinion, the cases concerning erroneous information should be covered under product liability if the information displayed is objective, scientific, real and accurate, which so is supposed to be for navigation charters. In fact, and unless an encyclopaedia falls on your head or a paper edge cuts you on a finger, it will be the information found in the product (the book or the chart) the one causing damage. Therefore, the main way in which a book, a charter, or software –which are obviously products *per se*- can cause damage is through the defective information that they may

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Cir.1985) 753 F.2d 794, 800; *Saloomey v. Jeppesen & Co.* (2d Cir.1983) 707 F.2d 671, 676-677. See also *Aetna Cas. And Sur. Co. v. Jeppesen & Co.* (9th Cir.1981) 642 F.2d 339, 342- 343).

[516] See *Brocklesby v. United States*; *ibid*; also see *Times Mirror Co. v. Sisk* 593 P.2d 924 (Ariz. C.A. 1978)

[517] *Saloomey v. Jeppesen & Co.* (2d Cir.1983) 707 F.2d 671

[518] See Schultz, *supra* 514, p. 438.

[519] See Schultz, *supra* 514, p. 443.

[520] See *Saloomey v. Jeppesen and Co., supra* 517.

[521] See Schultz, *supra* 514, p. 443 - 444 quoting the verdict on *Winter v. GP Putnanis*.

[522] See Restatement (Third) of Torts section 19 a) , *supra* 490.

[523] See Restatement (Third) of Torts Commentary d) to section 19, p. 270; *supra* 490.

contain. Furthermore this view can be further supporter with the following two arguments: First, we have already studied how a failure to provide a product with the necessary warnings or instructions turns the said *regular* product into a *defective* product. Second, in a similar way as the Restatement (Third) of Torts, the EU Product Liability Council Directive 85/374/EEC of 1985[524] amended by the Directive 1999/34/EC[525] considers 'product' as "all movables even if incorporated into another movable or into an unmovable. 'Product' includes electricity."[526] These two issues could lead to the conclusion that information, although not a tangible product, may be regarded, and perhaps should be regarded, as a product in the sense of product liability law, in case it is used as a necessary tool or the user its relaying on the officially accurate information provided in the 'product', regardless of the format.

2.3 *Defences of The Manufacturer.*

First of all it is worthy to point out that insurance[527] is available for product liability claims.[528] Although this is not legally speaking a defence, it will be used in many cases by manufacturers, and at least in some sense, could be regarded as a *de facto* defence.

The legal defences, apart from the general rules of invalidity of a contract (incompetence to conclude a contract, illegal purpose of the contract, coercion, violence, fraud, etc.) are as follows:

- Contractual defences[529] -waivers of liability[530] and best efforts clauses, disclaiming of express or implied warranties, previously discussed[531]- are

[524] Council Directive 85/374/EEC, see *infra* 621.
[525] EU Directive 1999/34/EC, see *infra* 636.
[526] Article 2 of the EU Product Liability Council Directive 85/374/EEC of 1985 as amended by the Directive 1999/34/EC in art 1, see *ibid.*
[527] See Hermida, *supra* 267, p. 282.
[528] H. L. van Traa-Engelman *Commercial Utilization of Outer Space* (Martinus Nijhoff Publishers Drodrecht / Boston / London, 1993), p. 325.
[529] Restatement (Third) of Torts, Section 18: "Commercial seller is not permitted to avoid liability to harm to persons through limiting terms in a contract [...]" *Supra* 490.
[530] *Appalachian Insurance v. McDonnell Douglas* 214 Cal. App. 3d 1, 32-33 (Cal. App.4. Dist. 1989.): "Appalachian contends strict liability may not be contractually disclaimed. While we agree with Appalachian that there are cases holding strict tort liability cannot be contractually disclaimed, [...] Under the strict liability doctrine, "[a] manufacturer is strictly liable in tort when an Article he places on the

normally allowed but with some limitations, and are strictly applied, so as not to violate public policies or limit third party liability, gross negligence or wilful misconduct.[532]

- Contributory negligence and assumption of risk:[533] There is contributory negligence[534] on the part of the damaged party when the claimant is below the standard required to be consistence with its own protection. Nevertheless, the plaintiff could still recover if the defendant has a clear last chance to avoid the harm and fails to do so -or, in cases of comparative negligence, where both parties act negligently and this is measurable, with an apportioning to each party of its

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market, knowing that it is to be used without inspection for defects, proves to have a defect that causes injury [...]" (*Greenman v. Yuba Power Products, Inc.* (1963) 59 Cal.2d 57, 62 [27 Cal. Rptr. 697, 377 P.2d 897, 13 A.L.R.3d 1049].) Strict liability theory was adopted because sales warranty theory, developed to meet the needs of commercial transactions and requiring a showing of privity, was inadequate to protect consumers. (*Kaiser Steel Corp. v. Westinghouse Elec. Corp.* (1976) 55 Cal.App.3d 737, 746-747 [127 Cal. Rptr. 838].) [...] In accord with the underlying purpose of the strict liability doctrine (to provide a *remedy for injuries to consumers injured by defective products* when contractual theories were inadequate), it has been held strict liability *cannot be contractually disclaimed in the consumer context.* As the Supreme Court explained in *Seely v. White Motor Co.* (1965) 63 Cal.2d 9, 17 [45 Cal. Rptr. 17, 403 P.2d 145], "[strict] liability [cannot] be disclaimed, for one purpose of strict liability in tort is to prevent a manufacturer from defining the scope of his responsibility for harm caused by his products." (See also *Vandermark v. Ford Motor Co.* (1964) 61 Cal.2d 256 [37 Cal. Rptr. 896, 391 P.2d 168], ["Regardless of the obligations it assumed by contract, it is subject to strict liability in tort because it is in the business of selling automobiles, one of which proved to be defective and caused injury to human beings."].) *In contrast, when a lawsuit over a defective product arises in a commercial setting and involves only a business loss, the courts hold strict liability theory is not available*; the parties are limited to normal commercial remedies (e.g., the California Uniform Commercial Code or their contracts). The cases reason strict liability theory should not apply to a commercial *transaction because: commercial entities are not "'in such a vulnerable position"' as are consumers* (see *Sumitomo Bank* v. *Taurus Developers, Inc.* (1986) 185 Cal.App.3d 211, 227 [229 Cal. Rptr. 719]; *U. S. Financial v. Sullivan, supra*, 37 Cal.App.3d 5, 18-19)" [Emphasis added]; Also see the comments of Professor Gorove *supra* 485, p. 99; Martin *Marietta v. Intelsat* 763 F. Supp. 1327, 1333: "It is true that courts normally find public policy to prohibit enforcement of contractual waivers of liability in cases of gross negligence. See *Boucher v. Riner,* 68 Md. App. 539, 543, 514 A.2d 485, 487 (1986) (holding that contractual waivers cannot shift risk of a party's own wilful, wanton, reckless or gross conduct). However, the Court finds that in the special context of this case, public policy strongly favors enforcement of waivers of all tort claims, including those for gross negligence." Also see Gorove *supra* 485, p. 58 to 70.

[531] See *supra* 447.

[532] See Kayser, *supra* 76, p. 171 and 172.

[533] See Black's Law Dictionary, *supra* 101; Contributory negligence: "A plaintiff's own negligence that played a part in causing the plaintiff's injury and that is significant enough 9in a few jurisdictions) to bar the plaintiff from recovering damages. In most jurisdictions, this defence has been superseded by comparative negligence." Assumption of risk: The act or an instance of a prospective plaintiff's taking on the risk of loss, injury, or damage [...] assumption of risk was an affirmative defense, but in most jurisdictions it has now been wholly or largely subsumed by the doctrine of contributory or comparative negligence [...]".

[534] See Kayser, *supra* 76, p. 193 commenting on *Lloyds of London v. McDonnell Douglas*; US Dist. Court Florida, Case 90-833 Civ-ORL-18 and 90-543 (1990).

portion of responsibility[535]-. Regarding assumption of risk, which may often apply to GNSS cases, the claimant must have given an expressed consent prior to suffering damage in order for the defendant not to be held liable. As seen previoulsy, these clauses limiting liability are strictly interpreted.[536]

- State of the art: This defence applies when the manufacturer could not reasonably have known of the danger at the time he manufactured and sold the product. There are some illustrative cases on the subject such as *Bruce v. Martin Marietta Corp.*, 1976.[537]
- Government contractor defence: This defence provides protection under certain circumstances for design-defects claims against contractors who manufacture for the U.S. Government.[538] Some authors believe that any claims arising from a defect of the GPS would entitle the manufacturer to raise the government constructor defence.[539] Under this defence, the contractor is not liable if a) the U.S. Government is immune from liability, as a result of State immunity, b) the U.S. Government approved or established reasonably precise specifications for the allegedly defective product, c) the allegedly defective product is in harmony with those specifications, and d) the supplier warned the government about dangers in the U.S.e of the equipment that were not known to the government but were known to the supplier.[540] Key among these four requirements is the immunity of the State, which mainly relates to the Federal Tort Claims Act already studied.

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[535] Kayser, *supra* 76, p. 168 and 169, citing the 'last clear chance doctrine'.
[536] Kayser, *supra* 76, p. 169 and 170.
[537] *Mike Bruce, ET AL. v Martin Marietta Corporation and Ozark Airlines Inc.* US Court of Appeals, 10th Circuit, (1976), Weber & Grossman, Vol. II at 5, *supra* 325.
[538] See G.M. Moore and J. D. Cavens, *supra* 17, p. 720.
[539] See G.M. Moore and J. D. Cavens, *supra* 17, p. 722.
[540] *Dowd v. Textron, Inc.* 792 F.2d 409, 410 (C.A.4 (Md.) 1986): "The decision of the United States Army to contract with Bell for a helicopter rotor system with which the Army had extensive familiarity and field experience operates to shield defendant from any liability for alleged design defects in that system."; Also see *Tozer v. LTV Corp.* 792 F.2d 403, 405 (C.A.4 (Md.) 1986.): "[...]the government contractor defence precludes recovery for negligence as well as strict liability." 792 F.2d 403, 406:"The defence protects against judicial interference in military matters [...]" 792 F.2d 403, 407: "While debate over the safety and necessity of advanced weaponry is essential, the First Amendment does not require that the forum be the courtroom or the vehicle be a lawsuit. The disallowance of recovery in these actions will not leave servicemen or their survivors without relief. The Veterans' Benefits Act "provides a swift, efficient remedy for the injured serviceman."[...] Forcing military mishaps into the mold of products liability litigation carries one final drawback. Pilots of the Navy and Air Force, whose service and sacrifice make possible the security of this country, are not the military doubles of civilian motorists. Their lives are led in the company of peril. We can express it no better than Judge Sneed did for the court in *McKay*: [...] This is part of the

- Prescription of the claim: Statutes of limitations and statutes of repose may be found to apply in a given case. There is a federal statute of limitations setting maximum periods of time during which to bring a claim and, in some states such time periods may be extended by the discovery rule – which tolls the statute of limitations until such time as the claimant discovers, or should reasonably have discovered, the existence of the wrongful act meaning discovery of the wrongful act- Statutes of repose, on the other hand, cause any right or action to terminate after a specific time regardless of when a claim is brought.[541]
- *Force majeure*, also known as Act of God defence,[542] may apply regardless of whether it is included in the terms of the contract. The Restatement (Second) of Torts explains that impracticability of the contract may occur, in which case the duties are discharged "by the concurrence of an event the non-concurrence of

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job."[...] "The second set of reasons for the government contractor defence also has its roots in military soil. Permitting recovery for design defects under any theory of liability risks altering the nature of the procurement process [...] We recognize this back-and-forth as a reality of the procurement process, as well as a valuable part of that process [...] The contractor's participation in design--or even its origination of specifications--does not constitute a waiver of the government contractor defence. If the defence were to be waived by such participation, the contractor would be trapped between its fear of liability and its desire to provide needed ideas and information. The "incentives for suppliers of military equipment to work closely with and to consult the military authorities in the development and testing of equipment" would be lost." 792 F.2d 403, 408: "Finally, disallowing the government contractor defence might raise the already high costs of military equipment." [...] "A supplier of military equipment is not subject to [strict liability in tort] for a design defect where: (1) the United States is immune from liability under *Feres* and *Stencel* [FN2], (2) the supplier proves that the United States established, or approved, reasonably precise specifications for the allegedly defective military equipment, (3) the equipment conformed to those specifications, and (4) the supplier warned the United States about patent errors on the government's specifications or about dangers involved in the use of the equipment that were known to the supplier but not to the United States." Also in Smith v. Lockheed Propulsion Co., 247 Cal.App.2d 774, 787-788 (Cal.App.4.Dist.,1967): Defendant relies upon the general rule that in the absence of negligence or unauthorized departure from plans and specifications, a contractor engaged in the construction of a public improvement under a contract with a public body is not liable for consequential injury to adjacent property that may result as a necessary incident from the prosecution of the work in accordance with the terms of the contract and the plans and specifications, citing *Yearsley v. W. A. Ross Constr. Co.* (1940) 309 U.S. 18 [84 L.Ed. 554, 60 S.Ct. 413]; *Myers v. United States* (1963) 323 F.2d 580; *Valley Forge Gardens, Inc. v. James D. Morrissey, Inc.* (1956) 385 Pa. 477 [123 A.2d 888] [...]".

[541] See Kayser, *supra* 76, p. 175 and 176.

[542] M. Tancelin, *Des Obligations. Contrat et Responsabilité* (Montreal: Wilson & Lafleur Itee, 1986), p. 324: "La force majeure ou cas fortuite se définit par les notions d'imprévisibilité et d'irresistibilite » Also see Black's Law Dictionary, *supra* 101; Act of God: "An overwhelming, unpreventable event caused exclusively by forces of nature, such as an earthquake, flood, or tornado. The definition has been statutorily broadened to include all natural phenomena that are exceptional, inevitable, and irresistible, the effects of which could not be prevented or avoided by the exercise of due care or foresight."

which was a basic assumption on which the contract was made [...] unless the language or circumstances indicate the contrary."[543]

As a brief conclusion to this study of U.S. law, it should be noted that although there do exist viable means of obtaining compensation from the U.S. Government if damage occurs due to a malfunctioning GPS, the present judicial trend places some obstacles in the recovery path, especially as far as the applicability of the FTCA to a 'foreign territory' is concerned. In the field of private law, the most attractive solution for recovery related to GPS seems to come from product liability law, which offers an attractive way out for recovery. In this area, it would be interesting to speculate on the hypothetical judicial development of regarding information as a product under product liability law.

3. *Public European Law. EU Law and States' Legal Responsibility Towards Their Nationals*

The emerging Galileo global positioning satellite system, which will serve as the alternative to the Russian GLONASS and the U.S. GPS, brings to light the necessity of undertaking a study of European laws in a similar way as has just been carried out with U.S. law.

3.1 EU Treaty Law and Derived Law.

The study of the European Union, as well as some major aspects of State responsibility in European domestic laws is essential due to the control and jurisdiction that the EU will take over the joint EU/ESA program Galileo.[544]

The EU is founded on the principles of the Treaties of Paris of 1951, establishing the European Coal and Steel Community,[545] and the Treaty of Rome of 1957, the treaty

[543] Restatement (2nd) of Torts sections 261-264, *supra* 385.
[544] See Galileo, *supra* 51.

establishing the European Economic Community and setting up the European Atomic Energy Community.[546] Some other important treaties, amending those just mentioned are the Merger Treaty of 1965 (which provided just one Commission and one Council for the three Communities), the Single European Act of 1987 (which introduced some adjustments for the achievement of the single and common internal market), the Treaty of Maastrich of 1992 (also known as the Treaty on European Union, which introduced major changes to the founding treaties, creating the concept of 'European Union' which entails the -currently two- Communities as well as other forms of cooperation, and also changed the formerly named European Economic Community into the actual European Community). Finally, there is the Treaty of Amsterdam, which is the latest one to enter into force, and the Treaty of Nice of 2001, which is not yet in force.[547]

In discussing the Treaty of Amsterdam,[548] it is better to note its formal status as the Treaty of the European Community as amended by the Treaty of Amsterdam.[549] The latter is the one that shall be currently regarded as the one establishing and ruling the activities of the EU. It also defines the functions of its organs and sets the principles of the European Community. Article 3 determines the common activities that the Community will carry out. Article 7 lists the organs of the EC that will ensure the development and functioning of the Communities, which are: The European Parliament, the Council, the Commission, the Court of Justice and the Court of Auditors. The European legislative process is regulated in Article 249 of the Treaty of Amsterdam:[550] "In order to carry out their task [...] the European Parliament acting jointly with the Council, the Council and the Commission shall make regulations and issue directives,

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[545] The Treaty establishing the European Coal and Steel Community (ECSC) was signed in Paris on 18 April 1951. It was concluded for a period of fifty years and it expired on the 23th of July 2002. For further information, visit <http://europa.eu.int/ecsc/index_en.htm> (Date accessed 26/06/2002).

[546] All these Treaties are available online at the European Union website <http://www.europa.eu.int/abc/treaties_en.htm> (Date accessed 26/06/2002).

[547] *Ibid.*

[548] Treaty of Amsterdam of 1997 or Treaty on European Union as amended by the Treaty of Amsterdam, establishing the provisions by which the Treaties of the Communities are amended, as well as some considerations on policy and cooperation. Official Journal C 340, 10.11.1997, pp. 145-172. Online available at <http://www.europa.eu.int/eur-lex/en/treaties/dat/eu_cons_treaty_en.pdf> (Date accessed 26/06/2002).

[549] Treaty of the European Community as amended by the Treaty of Amsterdam [Hereinafter Treaty of Amsterdam], Official Journal C 340, 10.11.1997, pp. 173-308. Online available at the European Union website <http://www.europa.eu.int/eur-lex/en/treaties/dat/ec_cons_treaty_en.pdf> (Date accessed 26/06/2002).

[550] See Treaty of Amsterdam, Article 249, *ibid.*

make recommendations or deliver opinions." A *Regulation* has general application and it is binding in its entirety and directly applicable in all Member States. A *Directive* is binding as to the result to be achieved, leaving the form of achieving the 'imposed' result to the national authorities. A *Decision* is binding on those who are addressed. Finally, recommendations and opinions have no binding force.

The European Communities are holders of legal personality, as the European Union itself does not hold this status.

The Treaty of Amsterdam also establishes the concept of 'citizenship of the Union',[551] intended to complement national citizenship. By this concept member States undertake to confer diplomatic and consular protection to other EU citizens in those countries where they have no representation from their own State,[552] thus enlarging enlarge to some extent the provisions of Article VIII of the Liability Convention.[553]

Title V of the Treaty of Amsterdam is dedicated to the common policy of transport, which is a one of the major benefits and sponsors of Galileo through the Directorate General of Energy and Transport of the Commission (DGET).[554] States accept, under this Title, to take "measures to improve transport safety",[555] in principle dealing with transport carried out by rail, road and inland waterway.[556] Under Article 153 the Community also seeks "to ensure a high level of consumer protection" and to protect the health, economic and safety interest of the consumers, and "[...] their right to information [...]"[557]. Title XIII refers to the trans-European networks in the areas of transport, telecommunications and energy, which also involve the development of Galileo.[558] Further Article 155, paragraph 3, establishes the principles of cooperation with

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[551] See Treaty of Amsterdam, Article 17, *supra* 549.
[552] See Treaty of Amsterdam, Article 20, *supra* 549.
[553] See Liability Convention 1972, Article VIII: "1. A State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation for such damage. 2. If the State of nationality has not presented a claim, another State may, in respect of damage sustained in its territory by any natural or juridical person, present a claim to a launching State. 3. If neither the State of nationality nor the State in whose territory the damage was sustained has presented a claim or notified its intention of presenting a claim, another State may, in respect of damage sustained by its permanent residents, present a claim to a launching State." *supra* 228.
[554] See EU DG Energy and Transport, *infra* 571.
[555] See Treaty of Amsterdam, Article 71, *supra* 549.
[556] EC Treaty as amended by the Treaty of Amsterdam of 1997, Article 80; *supra* 549. In addition, it leaves the door open for air and sea transport.
[557] See Treaty of Amsterdam, Article 153, *supra* 549.
[558] See Treaty of Amsterdam, Title XIII, *supra* 549.

third countries, with the aim "to promote projects of mutual interest and to ensure the interoperability of the networks."[559]

Under Part Five of the Treaty of Amsterdam, the institutions of the Community are defined. The European Parliament is regulated under Articles 189 to 201. Article 202 defines the Council, which shall ensure the achievement of the objectives set out in the Treaty. Finally, Articles 211 *et seq.* set up the rules for the Commission, which is in charge of ensuring the proper development and operation of the common market.

Therefore, it is under the Commission where the Galileo program is being developed as a way of implementing European policies on transport and the trans-European networks, without forgetting the common policies on industries, development and research.

Finally, the European Court of Justice is established under Articles 220 *et seq.* This Court is the organ in charge of interpreting and applying the European law, and a First Instance Court is attached to it. The Court of Justice may start a procedure *ex officio* or by request of the Commission or of any of the Member States, or upon request of national court for a 'preliminary ruling' under Article 234. In terms of GNSS it is very important to note also that individuals may have recourse before the Court of Justice, in relation to non-contractual liability as pointed out by Article 235 in relation to Article 288, as has also been jurisprudentially recognized.[560] The individual recourse has also

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[559] See Treaty of Amsterdam, Article 155. 3, *supra* 549.

[560] EU Court of First Instance, Case T-177/01 (Judgment of 3rd May 2002) European Court reports 2002 Page 00000, paragraph 40: "The Commission, on the other hand, takes the view that the applicant is not denied access to the courts, since it can bring an action for non-contractual liability pursuant to Article 235 EC and the second paragraph of Article 288 EC." Online available at the European Union website <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=62001A0177&model=guichett >. (Date accessed 26/06/2002); Also see EU Court of First Instance, Case T-196/99 (Judgment of 6th December 2001) "[...] Community law confers a right to reparation under the second subparagraph of Article 288 EC where three conditions are met, namely that the rule of law infringed is intended to confer rights on individuals [...]" Paragraph 42. Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=61999A0196&model=guichett > (Date accessed 26/06/2002); Also see EU Court of First Instance, *Alsace International Car Service SARL (AICS) v. European Parliament,* Case T-365/00 (Judgment of 11th June 2002), European Court reports 2002 Page 00000: "It has been consistently held that, under the second paragraph of Article 288 EC, the non-contractual liability of the Community depends on fulfilment of a set of conditions as regards the unlawfulness of the conduct alleged against the institution, the fact of damage and the existence of a causal link between the conduct in question and the damage complained of. Accordingly, the Community may not be held liable unless all those conditions are met (Case 26/81 *Oleifici Mediterranei* v *EEC* [1982] ECR 3057, paragraph 16, and Case T-336/94 *Efisol* v *Commission* [1996] ECR II-1343, paragraph 30)." Paragraph 78. Online available at the European Union website

being recently confirmed by the recent opinion of the Advocate General Jacobs,[561] delivered on 21 March 2002, affirming that "under Community law there are no restrictions on the standing of individuals to bring actions for damages under Articles 235 EC and 288 EC. The class of individuals capable of seeking damages for loss caused by Community measures is thus unlimited."[562]

In case of claims arising from Galileo, it is important to note that the Court of Justice has jurisdiction to hear claims relating to compensation for damage provided for in Article 288. This Article states that the contractual liability of the Community shall be governed by the law of contracts, while for non-contractual liability, the Community "shall, in accordance with the general principles common to the laws of the Member States, make good any damage caused by its institutions or by its servants in the performance of their duties."[563]

Important also are Statutes of The Court of Justice.[564] In its Article 43,[565] these Statutes bar recourse to the Court of Justice after a period of 5 years for non-contractual damages.

Case law has established the requisites for finding liability on the part of any of the European Institutions, as has been pointed out several cases, including *Elliniki Viomichania Oplon AE (EVO) v. Council of the European Union and Commission of the European Communities,*[566] which required a showing of the unlawfulness of the conduct

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<http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=62000A0365&model=guichett > (Date accessed 26/06/2002).

[561] Protocol on the Statute of the Court of Justice, signed at Brussels on 17 April 1957, as last amended by Article 6 III (3)(c) of the Treaty of Amsterdam, Articles 2 to 8. The advocates general assist the Court in its task. They deliver, in open court and with complete impartiality and independence, opinions on the cases brought before the Court. Online available at <http://curia.eu.int/en/txts/acting/statut.htm> (Date accessed 26/06/2002).

[562] Advocate General Jacobs, (Case C-50/00 P) *Unión de Pequeños Agricultores v Council of the European Union* delivered on the 21st of March 2002. Online available at the European Union website <http://europa.eu.int/servlet/portail/CuriaServlet?curiaLink=%26lang%3DEN%26ident%3D4744%26model%3Ddoc_curia > (Date accessed 26/06/2002).

[563] See Treaty of Amsterdam, Article 288; *Supra* 549.

[564] Statutes of the Court of Justice, online available at <http://curia.eu.int/en/txts/acting/statut.htm> (Date accessed 26/06/2002).

[565] See Statutes of the Court of Justice. See *ibid*, Article 43: "Proceedings against the Community in matters arising from non-contractual liability shall be barred after a period of five years from the occurrence of the event giving rise thereto. The period of limitation shall be interrupted if proceedings are instituted before the Court or if prior to such proceedings an application is made by the aggrieved party to the relevant institution of the Community."

[566] *Elliniki Viomichania Oplon AE (EVO) v. Council of the European Union and Commission of the European Communities,* Court of First Instance (24th April 2002) Case T-220/96, *European Court reports*

of the European Institution, actual damage, and a causal link.[567] These three conditions must be fulfilled; otherwise the action will be dismissed.[568]

This section will now comment on the major Directorates-Generale involved in the Galileo project, in order to briefly analysed the applicable legislation. The first one is the DG of Research and Development, which finds its basis in Articles 163 to 173 of the Treaty of Amsterdam.[569] Important legislation is found in these Articles, such as the implementing arrangement between the National Institute of Standards and Technology of the Department of Commerce of the United States of America and the Commission of the European Communities for cooperation in the fields of metrology and measurement standards.[570]

2002 Page 00000 paragraph 81, "It is settled case-law that non-contractual liability on the part of the Community under the second paragraph of Article 215 of the Treaty is subject to a number of conditions relating to the unlawfulness of the conduct alleged against the Community institutions, actual damage and the existence of a causal link between the conduct of the institution and the damage complained of (Case C-104/97 P *Atlanta* v *European Community* [1999] ECR I-6983, paragraph 65, and Joined Cases T-198/95, T-171/96, T-230/97, T-174/98 and T-225/99 *Comafrica and Dole Fresh Fruit Europe* v *Commission* [2001] ECR II-1975, paragraph 131). Since those three conditions must all be satisfied, if any one of them is not satisfied, the entire action must be dismissed and it is not necessary to consider the other conditions (Case C-146/91 *KYDEP* v *Council and Commission* [1994] ECR I-4199, and *Atlanta* v *European Community*, paragraph 65)." Paragraph 39, and also online available at the European Union website <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=61996A0220&model=guichett > (Date accessed 26/06/2002).

[567] *Elliniki Viomichania Oplon AE (EVO) v. Council of the European Union and Commission of the European Communities,* see *ibid.* "According to settled case-law, there is a causal link for the purposes of the second paragraph of Article 215 of the Treaty where there is a direct link of cause and effect between the fault allegedly committed by the institution concerned and the damage pleaded, the burden of proof of which rests on the applicant (Case T-168/94 *Blackspur and Others* v *Council and Commission* [1995] ECR II-2627, paragraph 40, and Joined Cases T-213/95 and T-18/96 *SCK and FNK* v *Commission* [1997] ECR II-1739, paragraph 98)." At paragraph 41.

[568] *Förde-Reederei GmbH v. Council of the European Union and Commission of the European Communities*, Court of First Instance (20^{h} February 2002) Case T-170/00, *European Court reports 2002 Page 00000*, paragraph 37 "[...] If any one of those conditions is not satisfied, the action must be dismissed in its entirety and it is unnecessary to consider the other conditions for non-contractual liability (Case C-146/91 *KYDEP* v *Council and Commission* [1994] ECR I-4199, paragraph 81)." Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=62000A0170&model=guichett > (Date accessed 26/06/2002).

[569] See Treaty of Amsterdam, *supra* 549.

[570] Implementing Arrangement between the National Institute of Standards and Technology of the Department of Commerce of the United States of America and the Commission of the European Communities for cooperation in the fields of metrology and measurement standards, Official Journal C 347, 03/12/1999 p. 0005 – 0006 (1999/C 347/03), online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/c_347/c_34719991203en00050006.pdf> (Date accessed 27/06/2002).

However, the main organ dedicated to GNSS is, as stated before, the DG of Transport and Energy,[571] which is the one most financially and politically involved in Galileo.[572] The Galileo program is considered to be "the key need for a global [transportation] program"[573] as stated in the White Paper of the Commission, which establishes current transport policy guidelines. Its activities are divided into inland, sea and air transport. Important are the Council Resolution of 24 October 1994 on telematics in the transport sector,[574] and the Commission Recommendation of 4 July 2001, on the

[571] Diretorate Generale of Energy and Trasnport [Hereinafter DGET]; information online at the EU website <http://www.europa.eu.int/comm/dgs/energy_transport/index_en.html> (Date accessed 27/06/2002).

[572] Council Resolution of 19 July 1999 on the involvement of Europe in a new generation of satellite navigation services - Galileo-Definition phase, *OJ C 221 03.08.1999 p.1;* Council Resolution of 19 December 1994 on the European contribution to the development of a Global Navigation Satellite System (GNSS) *OJ C 379 31.12.1994 p.2.* Online available at the EU website <http://www.europa.eu.int/eur-lex/en/lif/reg/en_register_0705.html> (Date accessed 27/06/2002).

[573] See White Paper of the Commission on "European Transport Policy for 2010 : time to decide", p. 94; *supra* 4.

[574] Council Resolution of 24 October 1994 on telematics in the transport sector *Official Journal C 309, 05/11/1994 p. 0001 – 0002* (94/C 309/01): INVITES the Commission: (a) to draw up a programme for the measures required at Community level for the implementation of telematics in the transport sector (action programme); (b) to support the work of standardization in air traffic management by means of all suitable measures, including research and development in this respect; (c) to advance the necessary work and to submit proposals which are in conformity with the principles of proportionality and subsidiarity and do not create more bureaucracy." And also agrees that eh following matters are of the utmost importance: "progress towards the introduction of interoperable automatic road traffic information and warning systems in Member States at European level, - standardization of testing criteria as well as of the assessment and approval procedures for in-vehicle information display in road transport, - guarantee of compatibility and interoperability of systems for data exchange between vehicle and infrastructure in road transport, - harmonization of the data bases for the Europe-wide utilization of digital road maps, - binding acceptance of the standards formulated by Eurocontrol under the conditions defined in Council Directive 93/65/EEC of 19 July 1993 on the definition and use of compatible technical specifications for the procurement of air-traffic-management equipment and systems (2), - introduction of a Community vessel movement reporting system for ships carrying dangerous or environmentally-hazardous goods on the basis of electronic data exchange systems, - further development of the information and communication systems for computerized data exchange between the authorities responsible for port State control, - implementation and improvement of the electronic data interchange for administration, commerce and transport (Edifact) for the compatibility of information and communication systems and for automatic transport control, CONFIRMS that the introduction of compatible telematics systems should also be advanced in rail transport, [and] REQUESTS the Commission and the Member States: (a) to exercise their influence on the European railways for the introduction of a European command and control system, (b) jointly to select trans-European cross-border axes in road and rail transport on which currently available telematics systems should be optimally applied; on road transport, in particular, jointly to define standard evaluation methods to test and interoperability at European level of road information services and data exchange systems in accordance with the orientations precribed in this resolution; (c) as a matter of urgency to discuss the Commission communication on satellite navigation services and to submit recommendations as soon as possible." Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31994Y1105(01)&model=guichett> (Date accessed 27/06/2002); Followed by a Council Resolution of 28 September 1995 on the deployment of telematics in the road transport sector, *Official Journal C 264 , 11/10/1995 p. 0001 – 0003,* online available at the European Union website

development of a legal and business framework for participation of the private sector in deploying telematics-based Traffic and Travel Information (TTI) services in Europe.[575] For shipping purposes, noteworthy is the Council Directive 96/98/EC of 20 December 1996 on marine equipment (as amended by Commission Directive 2001/53/EC of 10 July 2001[576]), as well as the Commission Decision on the application of Article 3(3)(e) of Directive 1999/5/EC to marine radio communication equipment intended to be fitted to seagoing non-SOLAS vessels (and which is intended to participate in the global maritime distress and safety system (GMDSS) and not covered by Council Directive 96/98/EC on marine equipment[577]).

Finally, air transport is another of the major activities of the DGTE of the Commission. We should not leave aside Commission Regulation (EC) No 2082/2000 of 6 September 2000 adopting Eurocontrol standards and amending Directive 97/15/EC,[578] and amending Council Directive 93/65/EEC.[579]

<http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31995Y1011(01)&model=guichett> (Date accessed 27/06/2002).

[575] Commission Recommendation of 4 July 2001 on the development of a legal and business framework for participation of the private sector in deploying telematics-based Traffic and Travel Information (TTI) services in Europe (Text with EEA relevance) (notified under document number C(2001) 1102) *Official Journal L 199 , 24/07/2001 P. 0020 – 0022,* recognizing that "a European satellite navigation system will have a positive impact on the development of traffic and travel services." Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32001H0551&model=guichett> (Date accessed 27/06/2002).

[576] Council Directive 96/98/EC of 20 December 1996 on marine equipment *Official Journal L 046, 17/02/1997 P. 0025 – 0056,* online available at the European Union website; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31996L0098&model=guichett> (date accessed 27/06/2002) *as* amended by Commission Directive 2001/53/EC of 10 July 2001 amending Council Directive 96/98/EC on marine equipment (Text with EEA relevance) *Official Journal L 204, 28/07/2001 P. 0001 – 0028,* online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_204/l_20420010728en00010028.pdf> (Date accessed 27/06/2002).

[577] Commission Decision of 22 September 2000 on the application of Article 3(3)(e) of Directive 1999/5/EC to marine radio communication equipment intended to be fitted to seagoing non-SOLAS vessels and which is intended to participate in the global maritime distress and safety system (GMDSS) and not covered by Council Directive 96/98/EC on marine equipment (notified under document number C(2000) 2719) (Text with EEA relevance) (2000/638/EC) *Official Journal L 269 , 21/10/2000 P. 0052 – 0053*; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32000D0638&model=guichett> (Date accessed 27/06/2002).

[578] Commission Directive 97/15/EC of 25 March 1997 adopting Eurocontrol standards and amending Council Directive 93/65/EEC on the definition and use of compatible technical specifications for the procurement of air- traffic-management equipment and systems (Text with EEA relevance) *Official Journal L 095, 10/04/1997 P. 0016 – 0018*, online available at the European Union website, <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997L0015&model=guichett> (Date accessed 27/06/2002).

[579] Commission Regulation (EC) No 2082/2000 of 6 September 2000 adopting Eurocontrol standards and amending Council Directive 93/65/EEC, *OJ L 254 09.10.2000 p.1,* online available at

Within the DGTE we can also find the Trans-European network program, regarding which is Commission Recommendation of 21 March 2001 on the basic parameters of the trans-European high-speed rail system (referred to in Article 5(3)(b) of Directive 96/48/EC) establishing standards for the high-speed rail community, and also covering electromagnetic interference.[580]

Another important document is Commission Decision of 21 March 2001 on the basic parameters of the command-control and signalling subsystem of the trans-European high-speed rail system (referred to as "ERTMS characteristics"), which sets up the characteristics of the European Rail Traffic Management System, which has as one of its component elements "the radio and telecommunication element (ERTMS/GSM-R - GSM for railways)."[581]

<http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32000R2082&model=guichett> (Date accessed 27/06/2002) amended by Commission Regulation (EC) No 980/2002 of 4 June 2002 amending Regulation (EC) No 2082/2000, adopting Eurocontrol standards (Text with EEA relevance) *Official Journal L 150 , 08/06/2002 P. 0038 – 0043,* online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32002R0980&model=guichett> (Date accessed 27/06/2002).

[580] Commission Recommendation of 21 March 2001 on the basic parameters of the trans-European high-speed rail system referred to in Article 5(3)(b) of Directive 96/48/EC on the interoperability of the trans-European high-speed rail system, *Official Journal L 100, 11/04/2001 P. 0017– 0026* (2001/290/EC) "[...] Interference generated on the signalling and telecommunication system: these characteristics vary in relation to the signalling and telecommunication system and will be specified in the corresponding TSIs. They will be covered by a heading in the infrastructure register; (d) radio frequency interference: European standard 50 121; (e) electromagnetic immunity of on-board equipment: European standard 50 121." Online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/c_347/c_34719991203en00050006.pdf> (Date accessed 27/06/2002).

[581] Commission Decision of 21 March 2001 on the basic parameters of the command-control and signalling subsystem of the trans-European high-speed rail system referred to as "ERTMS characteristics" in Annex II(3) to Directive 96/48/EC (notified under document number C(2001) 746) *Official Journal L 093 , 03/04/2001 P. 0053 - 0056* (2001/260/EC) Online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_093/l_09320010403en00530056.pdf> (Date accessed 27/06/2002); Also see the Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, *OJ L 110 20.04.2001 p.1*; the 2000/761/EC: Commission Decision of 16 November 2000 defining the specifications of projects of common interest identified in the sector of the trans-European energy networks by Decision No 1254/96/EC of the European Parliament and of the Council (notified under document number C(2000) 2683) (Text with EEA relevance) *OJ L 305 06.12.2000 p.22*; 1999/569/EC: Commission Decision of 28 July 1999 on the basic parameters for the command-and-control and signalling subsystem relating to the trans-European high-speed rail system (notified under document number C(1999) 2475) - (Text with EEA relevance) *OJ L 216 14.08.1999 p.23;* Decision No 1336/97/EC of the European Parliament and of the Council of 17 June 1997 on a series of guidelines for trans-European telecommunications networks *OJ L 183 11.07.1997 p.12*; Council Resolution of 17 June 1997 on the development of telematics in road transport, in particular with respect to electronic fee collection, *OJ C 194 25.06.1997 p.5* ; Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system, *OJ L 235 17.09.1996 p.6;* online available at <http://www.europa.eu.int/eur-lex/en/lif/reg/en_register_1360.html> (date accessed 27/06/2002).

Failure to comply with any of these standards or regulations, or damage caused by any of the Institutions of the Communities (*e.g.* any damage caused by Galileo signals resulting in a train accident) would also imply the applicability of Articles 235 and 288 of the Treaty of Amsterdam determining the civil liability of the Commission.

3.2 State Civil Responsibility.

State civil responsibility deals with the responsibility and liability regime that applies to damage caused by employees or agencies of a government, resulting from an action or omission of the employees or agencies of a government, regardless of whether the source for this regime comes from European law or from purely domestic law.

It is important to remember that all government liability is related to the concept of sovereign immunity, which has been analyzed already. We could say that waivers of sovereign immunity are common to all EU member states, though there has been no European harmonization law regarding the issue. In Austria, *e.g.*, the Administrative Liability Act (Amshaftungsgesetz) maintains that a public authority that commits a breach, in abrogation of an "operational and management criteria" is liable.[582]

In Spain, this is established by Law 30/92 of 26th of November, on the Legal Regime of the Public Administrations and of the Regular Administrative Process.[583] Article 3 establishes that the Spanish government and its agencies shall respect the Spanish Constitution, and the existing Spanish law, while the State's immunity is waived in Title X.[584] Title X begins with Chapter I, dealing with the Patrimonial Responsibility of the Public Administration. It establishes that the Public Administration will be held liable for all damage caused, to property or rights of a person, as a consequence of the normal or

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[582] Austria's Administrative Liability Act; <http://curia.eu.int/en/recdoc/apercu/2000/rapport.pdf> (Date accessed 27/06/2002), p. 53.

[583] Ley 30/92, de 26 de noviembre, de Régimen Jurídico de las Administraciones Públicas y del Procedimiento Administrativo Común (Parte III) (B.O.E. 27.11.92) – Law 30/92, of 26th of November, on the Legal Regime of the Public Administration and on the Regular Administrative Process (3rd Part) (Published in the Government Official Journal 27.11.92) Available in original Spanish on the Ministerio de Administraciones Publicas website (Ministry of the Public Administration) <http://www.igsap.map.es/cia/dispo/l30-92.htm> (Last updated 10/06/2002) (Date accessed 27/06/2002) (Unofficial translation).

[584] Title X, on the Responsibility of the Public Administration, its authorities and other personnel, (Unofficial translation), Articles 139 *et seq.* Online available at <http://www.igsap.map.es/cia/dispo/l30-92.htm#t10> (Last updated 10/06/2002) (Date accessed 27/06/2002).

abnormal functioning of public services. Article 144 rules the activities of the state or its agencies for their private activities (*acta jure gestionis*), and establishes that they will be held directly liable for the damages caused. Damage must be effective, economically measured/valuable, and must be able to be individualized. The State will not be held liable for those damages caused by *force majeure* or Act of God, nor those derived from facts or circumstances that could not be prevented or avoided given the state of scientific or technical knowledge at the time damage was caused, notwithstanding the social and/or economic governmental aid established by law for such cases.[585]

Chapter II governs liability for damage caused by the authorities and employees of the Government or its agencies. Individuals may directly sue the administration or agency for damage caused by it or its employees.[586] Once the Administration has indemnified the injured person, it may present a claim against its employees, in the case of a wrongful act, fault or severe negligence, taking into account the intention to cause damage and the causal link.

It is important to point out that an individual person may initiate the legal procedure, which may also be initiated *ex officio* in accordance with Articles 68, 69 and 70.[587]

As has been previously mentioned, civil law systems are very similar; hence the rules waiving State immunity and declaring civil liability of governments, agencies or their employees are very similar across Europe.

4. *Private European Civil Law*

In the same manner as was done for U.S. law, this section will now briefly analyse the contractual and extra-contractual liability regimes in the European Union. In the case of Galileo, in contrast to GPS, liability may not be such a major issue, since some Galileo services will be offered under a contractual regime, as already described.[588]

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[585] Law 30/92 as drafted and modified by Law 4/1999 of 13th of January, (B.O.E. 14.01.99) Articles 139, 141 and 144; Online available at <http://www.igsap.map.es/cia/dispo/l4-99.htm> (Last updated 10/06/2002) (Date accessed 27/06/2002).
[586] See Law 30/92, Title X, Chapter II, Article 145; *supra* 583.
[587] Law 30/92, Title VI, Chapter I, arts. 68 *et seq.*, *supra* 583.
[588] See Galileo, *supra* 51.

4.1 *Contractual Liability*

Here are discussed the main aspects of the law of contract in civil tradition systems, including, specifically, civil law provisions under the French and Spanish legal systems.

Under both French and Spanish law, the law of contracts is legislated respectively in the French[589] and Spanish[590] Civil Codes. Contracts are regulated under Livre III, Titre III of the French Code and in Book IV of the Spanish one. Contracts are similarly defined in both codes as the obligation arising between two or more parties that agree to oblige themselves to do or to give something for or to the other.[591] Contracts of sale are covered in Articles 1582 *et seq.* of the CCF, and of Articles 1445 *et seq.* of the SCC. In addition, the SCC governs contracts for services under arts. 1583 *et seq.*, while in the CCF service contracts are covered under the section entitled "Du louage d'ouvrage et d'industrie" in arts. 1779 *et seq.*

Leaving aside the general theory of contracts and the elements required therefor – that is, consent to agree and be bound, object of the contract, and cause of the obligation- this section concentrates on liability resulting from breach of contract, breach of warranties, and also on the rules of interpretation of contracts.

a) *Liability for Breach of Contract*:

Contractual liability is covered in Articles 1146 *et seq.* of the CCF, and in Articles 1094 *et seq.* of the Spanish Civil Code. The obligations can be divided into obligations to

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[589] French Civil Code [Hereinafter CCF]<http://www.legifrance.gouv.fr/html/frame_codes1.htm> (date accessed 28/06/2002).

[590] Spanish Civil Code of 1889 [Hereinafter SCC] <http://www.igsap.map.es/cia/dispo/ccivilindiceg.htm> (date accessed 28/06/2002).

[591] CCF, *supra* 589, Article 1101: « Le contrat est une convention par laquelle une ou plusieurs personnes s'obligent, envers une ou plusieurs autres, à donner, à faire ou à ne pas faire quelque chose. »; SCC Article 1254 "El contrato existe desde que una o varias personas consienten en obligarse, respecto de otra u otras, a dar alguna cosa o prestar algún servicio." [SCC, *supra* 590; Article 1254: "Contract exists since one or several individuals agree to oblige themselves in respect to the others to give something or to render some service"; Unofficial translation].

do, to give, or to refrain from doing.[592] Both in French and in Spanish law the standard of care is referred to, as that of a 'good head of a family',[593] (which is also known as the conduct of a reasonable and diligent man under consumer law[594]). This standard of care will be modified as circumstances change, so courts may apply different standards of care depending on the circumstances faced by the 'good head of a family'.

Legal doctrine and case law have differentiated between obligations of result and obligations of means.[595] Obligations of result are those by which a party undertakes to achieve an agreed result, while obligations of means are those by which the undertaking party agrees to use its best efforts, or to use its achievable means, to do something. In order to determine when an obligation is of result or of means, if nothing is said in the contract, the criteria to be followed is that of the uncertainty of the activity that will determine the certainty of the execution of an obligation.[596] In order to have liability due to a breach of an obligation, certain conditions must be met: non-performance of the obligation, damage, and the causal link.[597] The breach of the obligation can also be

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[592] SCC, see *supra* 590, Article 1088: "Toda obligación consiste en dar, hacer o no hacer alguna cosa." [CCS Article 1088: "Any obligation consists on giving, doing, or not doing something"; Unofficial translation.]

[593] CCF, *supra* 589 Article 1137: "bon père de famille", and SCC, see *supra* 590 Article 1104 and Article 1094 "buen padre de familia" [SCC "good head of a family"].

[594] TJEC, Case C-210/96 *Gut Springenheide and Tusky* [1998] ECR I-4657, paragraph 31: "In those cases, in order to determine whether the description, trade mark or promotional description or statement in question was liable to mislead the purchaser, the Court took into account the presumed expectations of an average consumer who is reasonably well-informed and reasonably observant and circumspect, without ordering an expert's report or commissioning a consumer research poll." See also Paragraph 37: " [...] the national court must take into account the presumed expectations which it evokes in an average consumer who is reasonably well-informed and reasonably observant and circumspect. However, Community law does not preclude the possibility that, where the national court has particular difficulty in assessing the misleading nature of the statement or description in question, it may have recourse, under the conditions laid down by its own national law, to a consumer research poll or an expert's report as guidance for its judgment." Online available at the European Union webiste. <http://europa.eu.int/jurisp/cgi-bin/form.pl?lang=en&Submit=Submit&docrequire=alldocs&numaff=&datefs=&datefe=&nomusuel=&domaine=&mots=reasonably+informed+consumer&resmax=100> (Date accessed 28/06/2002); Also see TJEC Case C-299/99 *Koninklijke Philips Electronics NV and Remington Consumer Products Ltd,*. Judgement of the Court [18 June 2002] paragraph 63: "[...]must be assessed in the light of the presumed expectations of an average consumer of the category of goods or services in question, who is reasonably well-informed and reasonably observant and circumspect". Online available at the EU website <http://europa.eu.int/jurisp/cgi-bin/form.pl?lang=en&Submit=Submit&docrequire=alldocs&numaff=&datefs=&datefe=&nomusuel=&domaine=&mots=reasonably+informed+consumer&resmax=100> (Date accessed 28/06/2002).

[595] See Kayser, *supra* 76, p. 197.

[596] See Kayser, *supra* 76, p. 198.

[597] SCC, see *supra* 590; Article 1101; and Article 1151 CCF, *supra* 589.

established by non-performance on time, by fault, by negligence, or by wrongful act or *animus dolendi.*

The classical remedies for the breach of contractual obligation are as follows:

- If there is a breach of contract and the performance of the contract has not been completed, there may be either a partial fulfilment of the obligation, or complete non-compliance. In the case of partial fulfilment, the obliged party will have to compensate for the damage caused, and will have the duty to comply with the contract. In case of total non-compliance, *e.g.* negligent loss of a thing legally presumed,[598] the obliged party will have the duty to perform its obligations if possible.[599] The indemnification for damages include not only the monetary value of the loss suffered, but also loss of profits.[600]
- "Exception of non-execution" applies to those contracts that entail obligations for both parties.[601] Article 1100[602] and Article 1256[603] of the SCC recognize to some extent this principle of exception for non-execution of the contract, which may be implemented directly by the parties. This exemption is applicable to obligations that are reciprocal, and courts must establish its applicability on a case-by-case basis. It can be seen as a means of pressure to be used for the benefit of damaged

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[598] SCC, see *supra* 590; Article 1098, 1182 in relation with 1183.
[599] SCC, see *supra* 590; Article 1098 paragraph 1 and Article 1157.
[600] SCC, see *supra* 590; Article 1106, with some exceptions found in Articles 1107-1110, dealing with cases of good faith, and strictly monetary looses.
[601] L. Díez-Picazo & A. Gullón, *Sistema de Derecho Civil*, (Madrid: Editorial Tecnos S.A., 1992), p.35: "Los contratos se llaman bilaterales o sinalagmáticos cuando crean obligaciones reciprocas, es decir, a cargo de ambas partes (ej. la compraventa, donde existe la obligación del vendedor de entregar la cosa y la del comprador de pagar el precio)" Original in Spanish ["Contract are called bilateral or 'sinalagmáticos' when they create reciprocal duties, that is, to both parties (e.g. contract of sale, where the duty of the seller is to deliver the thing, and the duty of the buyer is to pay the price."; Unoffcial trasnlation]; Also see M. Tancelin, *supra* 542, p. 34: « Contrat synallagmatique est celui qui crée des obligations corrélatives et réciproques a la charge de deux parties. Generalment les contrats sont synallagmatiques. Ainsi dans la vente, le vendeur s'oblige a livrer la chose vendu et l'acheteur a en payer le prix » .
[602] SCC, see *supra* 590; Article 1100: "[...]En las obligaciones recíprocas ninguno de los obligados incurre en mora si el otro no cumple o no se allana a cumplir debidamente lo que le incumbe. Desde que uno de los obligados cumple su obligación, empieza la mora para el otro." [SSC Article 1100: In reciprocal obligations, none of the parties will incur in penalty for delay if the other does not comply with its obligation [...] Once one of the parties comply with its obligation, penalty for delay begins for the other"; Unofficial translation.]
[603] SCC, see *supra* 590; Article 1256: "La validez y el cumplimiento de los contratos no pueden dejarse al arbitrio de *uno* de los contratantes." [Emphasis added] [Article 1256 "Validity and compliance with a contract shall not be left to the will of *one* of the contracting parties"; Unofficial translation.] Also see CCF, *supra* 589; Articles 1612, 1651, 1653, 1704, and 1948.

party, whose reaction must be in conformity with the principal of proportionality.[604]

- Finally, termination of the contract, with subsequent indemnification for damages, is the last contractual remedy. Indemnification for damages is foreseen in Articles 1101 *et seq.* of the SCC, for which the party breaching the contract will have to respond, except "unforeseeable or inevitable events".[605] Under Article 1184 of the CCF, courts can pronounce termination of a contract if there is non-performance of the contract. In this case, the parties shall take all measures to restore the situation to the *status quo*, as if the contract had never existed. In the SCC a substantially similar provision is found in Articles 1290 *et seq.* [606]

b) Obligation of Conformity and Warranty for Latent Defects:

The obligation of conformity is the obligation imposed on the seller to deliver the goods in the exact manner as agreed under the contract. This obligation can be found in Article 1243 to 1246 of the French Civil Code,[607] and in Articles 1461, 1157 and 1166 of the Spanish Civil Code.[608] A breach of contract in this case could lead to any of the remedies reviewed just above.

Another warranty is the one for latent products.[609] This warranty is set up by Articles 1461, and 1474 of the SCC, which state that the seller will be responsible for a product before the buyer for the "hidden defects that it may have." Also deserving special attention are Articles 1484 to 1488, where the SCC gets closer to the U.S. warranty of fitness, and makes the seller liable for hidden defects that make the sold thing useless for the intended purpose, even though the seller did not have knowledge about the defects. In the case of bad faith on the part of the seller, the buyer will be allowed to recover for damages and interest. Otherwise, the buyer has only the right to cancel the contract, and

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[604] See Kayser, *supra* 76, p. 201.
[605] SCC, see *supra* 590; Article 1105 : "Fuera de los casos expresamente mencionados en la Ley y de los en que así lo declare la obligación, *nadie responderá de aquellos sucesos que no hubieran podido preverse, o que, previstos, fueran inevitables.*" [Emphasis added] [SCC Article 1105: "Otherwise expressly mentioned by Law or otherwise so declared in an obligation, nobody will be responsible for those events that could not be foreseeable, or, if they where, they where inevitable."; Unofficial translation].
[606] SCC, see *supra* 590; Article 1295.
[607] CCF, see *supra* 589; Arts. 1243 to 1246.
[608] SCC, see *supra* 590; Arts. 1461, 1157 and 1166.
[609] In French, 'garantie des vices caches'; in Spanish, 'garantía por vicios ocultos'.

either recover the amount paid, or keep the product with a proportionate reduction in the price, as affirmed in Article 1486.

Regarding the contractual warranties that may be established, Article 1485 permits limitations on the warranties agreed, but such limitations will only apply if the seller did not have knowledge of the existence of the defects.[610] Also important, for the subject of sales of satellites, is the provision of Article 1488 affirming that in case of loss of the product after sale, due to defects at the time of purchase -whether the loss is fortuitous or due to fault on the side of the *buyer*- the buyer will still be able to recover the price paid with a reduction for the value of the product (*e.g.* the satellite) at the time it was lost.

Latent defects are also regulated in French law, under Articles 1641 *et seq* of the CCF.[611]

Although in principle the burden of proof is on the buyer both in French and Spanish law, for a contract between a seller-professional and a non-professional buyer, the burden of proof will shift to the side of the seller-professional,[612] as there is a presumption of 'bad faith.'[613]

c) Rules of interpretation of contracts:

In the French Code, rules of contract interpretation can be found under Articles 1135 and from Articles 1156 to 1164.[614] Together with Article 1135, Article 1156 establishes the main rule of contract interpretation, which is that priority shall be given to the common will of the parties.[615] In the SCC, rules of interpretation of the contracts are found under Articles 1281 and followings. The main difference with the French Code is

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[610] SCC see *supra* 590; Article 1485: "El vendedor responde al comprador del saneamiento por los vicios o defectos ocultos de la cosa vendida, aunque los ignorase. Esta disposición no regirá cuando se haya estipula do lo contrario, y el vendedor ignorara los vicios o defectos ocultos de lo vendido." [SCC Article 1485: "The seller will be liable to the buyer for recovering for those hidden defects found in the sold thing, even if he did not know about them. This disposition will not be applicable if otherwise agreed, and the seller had no knowledge of the hidden defects of the sold thing." (Unofficial translation)].

[611] CCF, *supra* 589; Arts. 1641 *et seq.*

[612] SCC see *supra* 590; Article 1484, *a sensu contrario.*

[613] See Kayser, *supra* 76, p. 204.

[614] CCF, *supra* 589; Article 1135 : «Les conventions obligent non seulement à ce qui y est exprimé, mais encore à toutes les suites que l'équité, l'usage ou la loi donnent à l'obligation d'après sa nature. » In a similar way, Article 1257 of the SCC; see *supra* 590.

[615] CCF, *supra* 589; Article 1164: «On doit dans les conventions rechercher quelle a été la commune intention des parties contractantes, plutôt que de s'arrêter au sens littéral des termes. »

that, while in the CCF the will of the parties will prevail over the text of the contract, in the Spanish Code if the text is clear and leaves no doubt about the intention of the parties it will be taken literally.[616]

Under both laws, if a party considers that the meaning of the clause differs from the most logical one, this party will bear the burden of proof. Also important are provisions that refer to the custom of the place where the contract was signed to interpret the contracts. Further, regarding 'obscure clauses', courts will construe them so as not to benefit the party who drafts them. Finally, for those cases where it is absolutely impossible to solve the doubts in a contract, courts may even resort to a declaration of nullification of the contract.[617]

4.2 *EU Product Liability Directive 85/374/EEC. Tort Liability in Domestic Laws: Negligence and Strict Liability.*

This section begins by analyzing EU law on torts, since EU law, which has harmonized and unified the domestic law of its 15 member states on this subject, serves therefore as a window to such national law.

a) *EU Product Liability Directive 85/374/EEC.*

Consumer[618] protection is addressed in Article 153 of the Treaty of Amsterdam,[619] which is one of the cornerstones of European policy as it is an important element of the "completion of the internal market."[620] The debate prior to the adoption of the Council

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[616] SCC, see *supra* 590; Article 1281: "Si los términos de un contrato son claros y no dejan duda sobre la intención de los contratantes se estará al sentido literal de sus cláusulas. Si las palabras parecieren contrarias a la intención evidente de los contratantes, prevalecerá ésta sobre aquéllas." [SCC Article 1281: " If the terms of a contract are clear and leave no doubt about the intention of the parties, the literal sense of its clauses shall be taken into account. If the wording seems to be contrary to the evident intention of the contracting parties, the intention will prevail over the text."; (Unofficial translation)].

[617] SCC, see *supra* 590; Articles 1287, 1288 and 1289. Also see CCF, see *supra* 589 Article 1159 and 1162.

[618] See the concept of Consumer in the EU, see *supra* 594.

[619] See Treaty of Amsterdam, Article 153, *supra* 549.

[620] See Treaty of Amsterdam, Article 153 paragraph 3 *a)*, *supra* 549.

Directive 85/374/EEC of July the 25th 1985[621] was said to be lengthy and intense.[622] It is important to be aware that this debate had been taking place in the EU since 1976, when the first proposed draft directive was passed.[623] As seen in the introduction of the Directive 85/374, and as also recognized by the TJEC,[624] the objectives of the Directive are: (1) the approximation of the laws of the member states concerning liability for products, in order to guarantee a high level of consumer protection against damage caused to health or property by a defective product; (2) the reduction of disparities between national liability laws, which could distort competition and restrict the free movement of goods; (3) to maximize the positive effect of the Directive for consumers; (4) to ensure the best compensation for the victims; (5) to maintain costs at the most reasonable level possible.[625]

According to Article 2, the Directive applies to movables that have been industrially produced, whether or not incorporated into another movable, or into an unmovable. Excluded are primary agricultural products and game products that have not undergone processing (except by derogation of the Member States). As indicated by Article 1 in relation with Article 4, the Directive establishes the principle of objective liability of the producer, in cases of damage caused by a defective product. Therefore, the claimant will only have to prove damage, defect and causal link. If more than one person

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[621] Council Directive 85/374/EEC of July the 25th 1985, on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products. Official Journal L 210, 07/08/1985, at 29 [Hereinafter Directive 85/374]. Online available at <http://europa.eu.int/comm/consumers/policy/developments/prod_liab/pl01_en.pdf> (Date accessed 29/06/2002).

[622] A.C. Spacone "Strict Liability in the European Union – Not a United States Analog", Roger Williams University Law Review 341: See Weber & Grossman, Vol. II, p. 142; *supra* 325.

[623] For further information on the consumers protection in the EU, please visit the EU website at <http://europa.eu.int/scadplus/leg/en/lvb/l32000.htm> (Date accessed 29/06/2002).

[624] TJEC (Fifth Chamber), 25 April 2002 (Case C-154/00), European Court reports 2002 Page 00000, *Commission of the European Communities v Hellenic Republic,* recital 2: "The Directive seeks to approximate the laws of the Member States concerning the liability of producers for damage caused by defective products. According to the first recital in the preamble thereto, approximation is necessary because legislative divergences may 'distort competition and affect the movement of goods within the common market and entail a differing degree of protection of the consumer against damage caused by a defective product to his health or property." Online available at the EU website <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=62000J0154&model=guichett > (Date accessed 29/06/2002).

[625] Commission of the European Communities, Green Paper on "Liability for defective products", COM (1999) 396 final, (Brussels 28.07.1999), p. 2. Online available at <http://europa.eu.int/comm/internal_market/en/update/consumer/greenen.pdf> (Date accessed 29/06/2002).

is liable for the same damage, joint liability will be established.[626] The concept of 'producer' has also been defined by the Directive to mean any participant in the production process, the importer of the defective product, any person putting their name, trade mark or other distinguishing feature on the product, and any person supplying a product whose producer or the importer cannot be identified.[627]

Article 6 dictates when a product is defective. The defectiveness of the product will be determined if the product does not provide the safety which a person is entitled to expect. Several factors must be taken into account when determining the expectation of the public, such as the presentation of the product, the use to which it could reasonably be put, and the time when the product was put into circulation.[628] However, the fact that a better product is subsequently put into circulation cannot be taken into consideration in determining the defectiveness of the product in question.

Damage is again a fundamental issue to be taken into account, as absence of damage means absence of liability. The types of damage covered by Article 9 of the Directive are damage caused by death or by personal injuries, and damage to an item of property (other than the defective product) intended for private use or consumption, with a value below Euro 500. Although in principle this seems to be rather limiting, the Directive does not restrict compensation for non-material damage, which will be left to the discretion of national legislation. An important statement is also found in Art. 14, which affirms that the Directive will not apply to injury or damage arising from nuclear accidents covered by international conventions ratified by member states. This means that the Directive will apply to all other types of products, including therefore space-related products such as satellites.

The Directive also establishes those cases where the 'producer' will be exonerated from liability under Article 7. This will occur if the producer proves any of the following: a) that the producer did not put the product into circulation; b) that the defect causing the damage came into being after the product was put into circulation by the producer; c) that the product was not manufactured for profit-making sale; d) that the product was neither

[626] Directive 85/374, see *supra* 621; Articles 15, 1, 4 and 5.
[627] Directive 85/374, see *supra* 621; Article 3.
[628] See Restatement (2nd) of Torts, *supra* 385; This text is similar to the one set out in the 402A.

manufactured nor distributed in the course of the produer's business; e) that the defect is due to compliance of the product with mandatory regulations issued by the public authorities; or f) that the state of scientific and technical knowledge[629] at the time when the product was put into circulation was not such as to enable the defect to be discovered[630] (this last defense being called the 'development risk defence').[631] This defence is, contrary to the 'state of the art' defence of the U.S., an absolute defence for the manufacturer. Both the industrial community and the European Parliament were opposed to a very restrictive application of this defense.[632] On this point, the member States are permitted to take measures by way of derogation according to Article 15 *(b)*.[633] Finally, the 'producer' will not be held liable if it is a manufacturer of a component of the final product, and the defect in the final product is attributable either to the design of the product or to the instructions given by the manufacturer of the final product. Negligence on the part of the consumer will also be taken into account in assessing the damage caused by a defective product, and the liability of the 'producer' may therefore be reduced -though not in the case of damage caused by a defective product and an act or omission of a third party-.[634]

A very important provision is established in Article 12, stating that the liability of the producer in relation to the injured person may not "be limited or excluded by a provision limiting his liability or exempting him from liability." Contrary to what is

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[629] TJEC, Judgment of the Court (Fifth Chamber) of 29 May 1997. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland. (Case C-300/95) European Court reports 1997, page I-02649 at paragraph 26: "Article 7(e) is not specifically directed at the practices and safety standards in use in the industrial sector in which the producer is operating, but, unreservedly, at the state of scientific and technical knowledge, including the most advanced level of such knowledge, at the time when the product in question was put into circulation." Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexplus!prod!CELEXnumdoc&lg=en&numdoc=61995J0300> (Date accessed 29/06/2002).

[630] This is similar to the "state-of-the-art" doctrine under US law, which we studied above, see *supra* 537.

[631] M. Mildred, "Product Liability and Electromagnetic Fields", Paper produced for the Health and Consumer Protection DG, p. 4 (November 2001). Online available at <http://europa.eu.int/comm/health/ph/programmes/pollution/conference/speeches/mildred_speech_en.pdf> (Date accessed 29/06/2002).

[632] J. M. Forbe, *Aviation products liability and insurance in the EU legal aspects and insurance of the liability of civil aerospace products manufacturers in the EU, for damage to third parties* (Deventer: Kluwer Law and Taxation - 1994), p. 50: Also Belgium, France, Ireland, and Luxembourg were favourable to exclude the 'development risk defence'.

[633] See Green Paper, *supra* 625 at Annex 1: Luxembourg, Finland and Norway have made use of Article 15. b) and have not adopt the defence in any form. France has also excluded it for products derived from the human body.

[634] Directive 85/374, see *supra* 621; Articles 7 f) and 8.2.

stipulated under U.S. law (where inter-party exclusion or limitation of liability is permitted and where limitation or exclusion of third party liability is forbidden), under the present Directive no party can, in the contract itself, limit or exclude its liability in relation to the other contracting party. In addition, and quite strangely, nothing is said in the Directive about limiting the liability of third parties. For that issue, one must look to provisions established under domestic laws, or to the general law of contracts.[635]

Article 13 is also important, as it establishes that the Directive shall not limit those rights relating to liability established in other liability regimes. This means that the Directive is not the exclusive remedy, and that the claimant may seek indemnification through other sources of law.

Under Article 10, the deadline established for recovering for damages is three years from the date the plaintiff becomes aware of the damage, of the defect, *and* of the identity of the producer; while Article 12 affirms that the producer's liability expires at the end of a period of ten years from the date on which the producer puts the product into circulation.

The Directive also makes a statement that may be of special relevance for the space industry -and specifically for GNSS satellites or GNSS activities-, as it permits each member state to set a limitation on a producer's total liability for damage resulting from death or personal injury caused by identical items with the same defect. Such a limitation could apply, *e.g.*, to the series of Galileo satellites, or (perhaps more likely) to Galileo receivers.

Finally, the Directive also provides for a periodic revision of its provisions, and provides for the Commission to report every five years to the European Institutions on its application of the Directive. Directive 85/374 has been amended by Directive 1999/34[636], which reinforces the language of the original Directive and states that "product safety and compensation for damage caused by defective products are social imperatives which must be met within the internal market."[637] Directive 1999/34 also extends the scope of applicability of Directive 85/374/EEC to primary agricultural products (such as meat,

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[635] The analyses of domestic laws will be carried out in paragraph b) below.
[636] Directive 1999/34/EC of the European Parliament and of the Council of the 10th of May, Official Journal 1999 L 141/20, at 20. [Hereinafter Directive 1999/34] Online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/l_141/l_14119990604en00200021.pdf> (Date accessed 29/06/2002).
[637] See Directive 1999/34, *ibid.*

cereals, fruits and vegetables) and game products, eliminating the possibility of derogation established in article 15.1 *a)* of the 1985 Directive. As a result of this, the producer or importer is required to pay compensation if there is a causal link between the damage sustained and the defect, without the injured person having to prove negligence on the part of the producer or importer.

A series of complementary measures has also been adopted, as well as the completion of the reports of the Commission. However, the state of the law appears to be in flux, for the European Parliament has called for a substantial revision of the current product liability system, resulting in the Green Paper on Liability for Defective Products of July 1999,[638] published just a couple of months after Directive 99/34. The Green Paper, which is the second study analyzing in depth the implementation of the Directive,[639] has collected data from consumers, producers, insurance companies, and others[640] in order to determine the extent to which the Directive has been useful, or (perhaps) needs to be modified.[641]

The conclusion that can be reached from the implementation of the Directive is that, "according to most replies the Directive functions properly, and has created a sophisticated and consumer oriented system. Some replies also point out that the implementation is still underway."[642] Two other important conclusions reached in various replies are that distinction should be made between manufacturing defect cases and design cases (on the one hand) and failure to warn cases (on the other), based on the experience of the U.S. Restatement (3rd) of Torts. While strict liability and the expectation test appear to work reasonably well for manufacturing defects, the reasonable forseeability test and negligence should govern claims for the latter.[643]

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[638] See Green Paper, *supra* 625.

[639] See Green Paper, *supra* 625, p. 7. The first report presented by the Commission was done in 13/12/1995 (COM (95) 617).

[640] See Green Paper, commenting on accidents, *supra* 625, p. 9: According to the Spanish 'Instituto Nacional de Consumo (Spanish National Institute for Consumption)', a study stated that the cause of accidents was chance (42.5%), lack of attention (21.4%), victims own negligence (15.4%), the action of a third party (7%), a design or production defect (2.8%), lack of information fro the manufacturer (0.2%), and failure to follow the instructions manual (0.4%), Informe Sistema EHLASS (1997).

[641] The Analyses of the Replies to the Commission Green Paper on Product Liability is available online at <http://europa.eu.int/comm/internal_market/en/goods/liability/analysis.pdf> (Date accessed 29/06/2002)

[642] See the Replies to the Green Paper, *ibid* at page 3.

[643] See Replies to the Green Paper, *supra* 641, p. 4.

Finally, it is important to note that many cases are still brought under domestic laws,[644] as the Directive does not cover damages below 500 Euros.[645] Nevertheless, the resort to national law cannot be made under a claim of product liability, as the Directive does not permit member states to establish any stricter or wider regime of liability to ensure the protection of its consumers.[646] Therefore, in such cases, citizens will have to file suit under general principles of extra-contractual liability, which will be later analyzed. For GNSS cases it is also important to make clear that the Product Liability Directive does not allow for recovery for pure economic loss (which, however, is not the same as loss of profits arising from damage to property or personal injury). Again, causality plays here a fundamental role, for the purpose of establishing whether the failure of a satellite or a receiver, producing an error in the signal, is directly linked to an accident. Cases of a satellite or receiver failure causing pure economic loss may fall out of the Directive's coverage. Nevertheless, such 'pure economic loss' could also fall under the rubric of non-material damage (recognized also in Article 9), which is left to the provisions of national legislation.

c) *Tort liability in Domestic Law: Negligence and Strict Liability*

This section shall examine two different subjects: first, the Product Liability Directive transposition to national laws, and second, the national regimes of some of the member States.

i. Transposition of the Directive:

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[644] See Replies to the Green Paper, see *supra* 641, p. 6: Besides the application of national laws, "Insurers, in particular, confirm that over 90% of claims concerning a product causing damage are settled out of court."

[645] See Replies to the Green Paper, *see supra* 641.

[646] TJEC (Fifth Chamber) 25 April 2002 (Case C-52/00), European Court reports 2002 Page 00000. *Commission of the European Communities, v French Republic,* at paragraph 14*:* "...the Directive was adopted by the Council by unanimity under Article 100 of the EEC Treaty (amended to Article 100 of the EC Treaty, now Article 94 EC) concerning the approximation of such laws, regulations or administrative provisions of the Member States as directly affect the establishment or functioning of the common market. Unlike Article 100 a of the EC Treaty (now, after amendment, Article 95 EC), which was inserted into the Treaty after the adoption of the Directive and allows for certain derogations, that legal basis provides *no possibility for the Member States to maintain or establish provisions departing from Community harmonizing measures*." [Emphasis added] Online available at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=62000J0052&model=guichett> (Date accessed 01/07/2002).

Article 19 of the Directive affirms that member States must bring the Directive into force in their respective countries.[647] Accordingly, all member states have currently implemented the Directive, France being the last to do so, in 1998,[648] after incorporating it into the French Civil Code under Articles 1386-1 to 1386-18.[649]

In Spain, prior to entrance into the European Union in 1986, the existing law was the General Law No. 26 of 19 July 1984 for the Protection of Consumers and Users,[650] which provides in Articles 25 to 28 for a system of strict liability enabling consumers and users to obtain compensation for damage caused by the use of a product, an item, or a service. Although this law is still in force, it has been modified with respect to product liability by Law No. 22 of 6 July 1994 on civil liability for damage caused by defective products,[651] in order to transpose the Directive into Spanish law. Nevertheless, the Law of 1994 is special law respective to the Law of 1984, and the General Law will still apply for those cases relating to products or services not falling under the terms of the Product Liability Law of 1994.[652] Article 2 of Law No. 22/94 defines the scope of applicability by reproducing the definition of 'product' that appears in Article 2 of the Directive. Finally, in its first closing provision, Law No. 22/94 provides that Articles 25 to 28 of Law No 26/84 do not govern civil liability for damage caused by the defective products mentioned in Article 2.

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[647] See Directive 85/374, Article 19; *supra* 621.

[648] Law No 98-389 of 19 May 1998 on liability for defective products, JORF of 21 May 1998, p. 7744.

[649] CCF, *supra* 589; Articles 1386-1 to 1386-18, insérés par Loi n° 98-389 du 19 mai 1998, Journal Officiel du 21 mai 1998. Online available <http://www.legifrance.gouv.fr/html/frame_codes1.htm> (Date accessed 02/07/2002).

[650] General Law No 26 of 19 July 1984 for the Protection of Consumers and Users, (*Boletín Oficial del Estado* 176 of 24 July 1984) online available in English at the Spanish National Institute of Consume at <http://www.consumo-inc.es/guiacons/interior/otrosdocumentos/ley2684/Ley26-84ingles.htm> (Date accessed 01/07/2002).

[651] Law No 22 of 6 July 1994 on civil liability for damage caused by defective products [Hereinafter 'Law No 22/94'] (Boletín Oficial del Estado No 161 of 7 July 1994, p. 21737 *et seq.*) Online available at the Spanish National Institute of Consume at <http://www.consumo-inc.es/guiacons/guia.htm> (Date accessed 01/07/2002).

[652] Sentencia Audiencia Provincial núm. 31/2000 Albacete (Sección 1ª), de 9 marzo
Recurso de Apelación núm. 401/1999. Jurisdicción: Civil. AC 2000\1145. "Fundamentos de Derecho: SEGUNDO.- [...] es preciso adelantar en primer lugar que la Ley 22/1994 sí ha de considerarse especial en su ámbito de aplicación [...]" [Judgment of the *Audiencia Provincial* No. 31/2000 of Albacete of March 9 2000 (Section No. 1) AC 2000\1145 Legal Fundaments: SECOND.- "[...] it should be said first of all that Law 22/1994 must be considered as special law within its scope of application [...]]" (Unofficial translation).

However, Articles 25 to 28 of the General Law of 1984 still apply for damage caused by items or by services, so the General Law of 1984 could still be relevant to liability related to the supply of GNSS services. Deciding which of the two legal norms is applicable is not an empty issue. Though it is true that under both laws the causal link and the damage must be proven by the victim, and that under both laws an incorrect use of the product may exonerate the producer from liability, it is also true that in the General Law of 1984, for certain types of services which require a higher standard of care, Article 28 assumes a causal link if the defendant cannot prove that he complied with the standard of care established by regulation, while in contrast, under the 1994 Law, the claimant must prove that the product does not respond to the expected level of safety.[653]

Another relevant issue is that in both the French transposition and in the Spanish, 'electricity' is considered a product (as established by the Directive 99/34[654]). According to the Directive, providers of electricity may also be liable[655] in accordance with Article 3 paragraph 3 of the Directive.[656] In addition, Spanish law includes gas as a product.[657] With these provisions in mind, it is interesting to speculate how courts might view a GNSS signal failure. Although it may be stretching the law too much, equity and analogy could cause a domestic court to apply the 'electricity' product concept to GNSS signals. In Spain there have already been several judgements dealing with gas or electricity within the scope of product liability, though there is still a lack of uniformity in the rulings for such cases. It is important to note that in one of these cases, dealing with the interruption of electricity service resulting in damage, the tribunal affirmed that the defect could not be considered as 'defective electricity' but as a defective service, and the court thus applied not the Law of 1994 but the General Law of 1984.[658] On the other hand, in a case of sudden lower tension on the electricity network, resulting in unexpected interruptions

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[653] See Sentencia Audiencia Provincial núm. 31/2000, *ibid.*

[654] See Directive 1999/34, *supra* 636, Article 1, replacing Article 2 of the Directive 85/374/EEC: "[...] 'product' includes electricity."

[655] See Law No 22/94, Article 4 paragraph 3; *supra* 651.

[656] Article 3 of the Directive 85/374, see *supra* 621.

[657] See Law No 22/94, Article 2; *supra* 651.

[658] Sentencia Audiencia Provincial núm. 149/2000 Almería (Sección 1ª), de 3 mayo, Recurso de Apelación núm. 265/1999. Jurisdicción: Civil AC 2000\3539, Fundamento de Derecho tercero.

of service, the court applied the Product Liability Law of 1994, thus requiring the damaged person to prove the causal link between the defect and the damages sustained.[659]

Meriting a brief comment is the General Law 26/84, which provides not only for damage caused by non-defective products, but also for services. Article 25 grants the consumer the right to recover for damages caused by (non-defective) products, or services or the consumption of goods, unless contributory negligence is involved. As pointed out by the Spanish Supreme Court, commenting on Article 25, it has been established that the burden of proof shifts.[660]

Even if a GNSS signal is not considered a product or a defective product, surely it may be seen as a service. Although the Galileo institutional and legal framework has not yet been established, it seems likely that a private corporation will be set up for the commercialisation of the service. Regarding liability, and waivers of liability, usually found in the space and telecommunications fields, Law 26/84 provides that liability-limiting contractual clauses are considered to be 'abusive clauses'[661] under the law,[662] and

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[659] Sentencia Audiencia Provincial núm. 222/1999 Huesca (Sección Unica), de 24 junio. Recurso de Apelación núm. 110/1999. Jurisdicción: Civil. Fundamento de Derecho Primero y Segundo.

[660] Sentencia Tribunal Supremo núm. 748/2001 (Sala de lo Civil), de 23 julio. Recurso de Casación núm. 1583/1996. Jurisdicción: Civil. AC 1999\1476: "TERCERO.- [...]El Article 25 de la Ley General para la Defensa de los Consumidores y Usuarios, contiene una norma de carácter general que reconoce al consumidor y usuario el derecho a ser indemnizado por los daños y perjuicios sufridos por el consumo de bienes o la utilización de productos o servicios, salvo que tales daños y perjuicios estén causados por su culpa exclusiva [...]; se establece así un principio de inversión de la carga de la prueba haciendo recaer sobre el productor o suministrador de los productos o servicios la carga de probar que el origen de los daños y perjuicios se encuentra en la conducta culposa del usuario o de las personas por las que debe responder[...]" [THIRD.- Article 25 of the General Law for the Protection of Consumers and Users, contains a norm of general character recognizing the right for the consumer or user to recover for damages suffered as a result of the consumption of goods or use of products or services, unless exclusive contributory negligence [...]; thus establishing a principle of law of shift of the burden of proof on the producer or supplier, that t have to proof that the damage was caused by the contributory negligence of the damaged persons [...]".

[661] See Law 26/84, see *supra* 650, Article 10 bis:" 1) Abusive clauses shall be considered as those stipulations which are not individually negotiated and which, in contrary to the requirements of good faith cause, in detriment to the consumer, a significant imbalance with respect to the rights and obligations of the two parties as set out in the contract. The examples of stipulations that are included in the additional provision to this Law shall be considered abusive clauses [...] 2) Clauses, conditions and stipulations, which are considered abusive, shall be null and void under the law and shall not be considered applicable" and Article 10: "The clauses, conditions or stipulations [...] including those provided by the public administrations and entities and companies depending upon them, must meet the following requisites: [...] *c) A* bona fide and fair balance between the rights and obligations of the parties, which, in all cases, excludes the use of abusive clauses."

[662] See Law 26/84, see *supra* 650, Additional Provisions "10.The exclusion or limitation of the professional's responsibility in fulfilment of the contract due to damages or death or injury suffered by the consumer resulting from an action or omission committed by the professional or freedom from

therefore they will be declared null and void[663] in accordance with Article 6 of the SCC[664]. Thus, any clause limiting civil responsibility on the part of the GNSS, other that the provisions for product liability, will not be valid under Law 26/84.

ii. General Law Civil Responsibility:

Civil liability -extra-contractual liability- responds to the idea of "causing damage to some other person, due to a breach of the general duty of *neminem laedere,* meaning the duty to refrain from harmfully acting towards third parties."[665]

The SCC addresses extra-contractual liability under Articles 1902 *et seq.* of the Spanish civil liability regime.[666] Article 1902 is the key provision of the civil liability system, establishing that "[t]he person who, by an action or omission causes damage to someone else, with fault or negligence, is obliged to repair the damage caused."[667] As in every fault-based system, causation must be shown between the action or omission and the damage therefrom resulting[668], and the burden of proof is on the victim.[669] Nevertheless, the Spanish Supreme Court has considered only the need to prove damage and causation, with a presumption of fault or negligence on the part of defendant - thus shifting the burden of proof to the defendant.[670] The exonerating defenses may be

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responsibility through the transfer of the contract to a third party without the consent of the debtor if this transfer could give rise to a weakening of the latter's guarantees."

[663] See Law 26/84, *supra* 650, Article 2.3 "Prior renunciation of the rights that this law bestows upon consumers and users in the acquisition and use of goods and services is null and void"; and also see Article 2 last paragraph.

[664] See SCC, see *supra* 590; Article 6.

[665] See L. Díez-Picazo & A. Gullón, "responde a la idea de la producción de un daño a orea persona por haber transgredido el genérico deber *neminem laedere*, es decir, el de abstenerse de un comportamiento lesivo para los demás" in original Spanish, p. 591; *supra* 601.

[666] See SCC, *supra* 590, art 1902 *et seq.*

[667] SCC, see *supra* 590, *Article* 1902: "El que por acción u omisión causa daño a otro, interviniendo culpa o negligencia, está obligado a reparar el daño causado." In original Spanish.

[668] Tribunal Supremo-Civil, Sala Primera, Judgment of 13/06/1988, paragraph 2: "sabido es que de aquellos tres requisitos que se exigen para el éxito de la acción que se ejercita, si en cuanto a la ilicitud y la culpa se refiere suscitan cuestiones de Derecho, la relación o nexo causal es tema de la exclusiva apreciación de la Sala sentenciadora..." In original Spanish [Known is that of the three requisites needed for the success of the action undertaken, the illicit act and the fault are a matter of Law, while the causal link is a matter of exclusive appreciation by the Court sentencing..."] Online available at the Spanish Ministry of Environment website <http://www.mma.es/normativa/jurisp/sent_IV_0003.htm> (Date accessed 03/07/2002).

[669] See L. Díez-Picazo & A. Gullón, *supra* 601, p. 598 and 603.

[670] Tribunal Supremo-Civil, Sala Primera, Judgment of 31/01/986, paragraph 3: " [...] no cabe prescindir de la repetida doctrina jurisprudencial acerca de la presunción *iuris tantum* de culpa en el agente a pesar del cumplimiento de las formalidades meramente reglamentarias una vez acreditada la realidad del menoscabo,

deduced from Article 1905.[671] For instance, in cases of *force majeure* or fault on the side of the damaged person, the defendant may escape liability. Some other defenses are self-defence and 'state of need'.[672]

In addition, three contrasts of liability may be observed: subjective and objective, direct and indirect, and principal and subsidiary.[673] The most important of these classifications is the one covering subjective and objective liability, as this classification determines on which party the burden of proof will fall.[674] While subjective liability would be the one of Article 1902 requiring proving fault, Spanish Supreme Court jurisprudence has elaborated the so-called "risk-theory," outside of Article 1902. This Supreme Court doctrine is oriented towards a system in which, though the conduct of the agent causing damage will not be totally eliminated, the Tribunal will accept *quasi*-objective solutions, as a result of the increment of dangerous activities due to technical

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con la inversión consiguiente del *onus probandi* -sentencias de once de abril de mil novecientos ochenta y cuatro, y trece de mayo y diez de julio de mil novecientos ochenta y cinco, entre otras muchas." In original Spanish [paragraph 3: 'we must not refrain from using the reiterate jurisprudential doctrine about the presumption of fault *iuris tantum* on the agent, regardless of the compliance with the legal formalities once the damage has been caused, with the subsequent inversion of the *onus probandi* – sentences of 11/04/1984, 13/05/1985, 10/07/1985, among others.] – Online available at the Spanish Ministry of Environment website <http://www.mma.es/normativa/jurisp/sent_IV_0001.htm> (Date accessed 03/07/2002).

[671] See SCC, *supra* 590, Article 1905.

[672] See L. Díez-Picazo & A. Gullón, *supra* 601, p. 610 and 611.

[673] See L. Díez-Picazo & A. Gullón, *supra* 601, p. 597.

[674] Tribunal Supremo-Civil, Sala Primera, Judgment of 24/05/1993, paragraph 4: "[...] la doctrina de esta Sala se orienta hacia un sistema que, sin hacer abstracción total del factor psicológico o moral y del juicio de valor sobre la conducta del agente, acepta soluciones *cuasi* objetivas, demandadas por el incremento de las actividades peligrosas consiguientes al desarrollo de la técnica y el principio de ponerse a cargo de quien obtiene el provecho la indemnización del quebranto sufrido por tercero, a modo de contrapartida del lucro obtenido con la actividad peligrosa (*«cuius est commodum, eius est periculum»*; *«ubi emolumentum, ibi onus»*), y es por ello por lo que se ha ido transformando la apreciación del principio subjetivista, ora por el acogimiento de la llamada «teoría del riesgo», ora por el cauce de la inversión de la carga de la prueba, presumiendo culposa toda acción u omisión generadora de un daño indemnizable [...] (SS. 16-10-1989, 8 mayo y 8 y 26 noviembre 1990 y 28-5-1991, por citar algunas de las más recientes [...] el núm. 2.º del Article 1908 CC [...] configura un supuesto de responsabilidad, de claro matiz objetivo, por razón del riesgo creado [...]" [parag. 4: "The doctrine of this Court is oriented towards a system that, without completely ignoring the psychological or moral factor nor valuating the conduct of the agent, accept solutions *cuasi* objectives, as an answer to the increment of dangerous activities following the development of technique and also due to the principle of giving to that who is obtaining the benefits the obligation to indemnify the one suffering the damage, as a balance of the benefit obtained with the dangerous activity (*«cuius est commodum, eius est periculum»*; *«ubi emolumentum, ibi onus»*), and that is why there has been a transformation from the subjective principle, through the so-called 'risk theory' or by the inversion of the burden of proof, which presumes as faulty all action or omission generating a damage may be indemnified [...] (SS. 16-10-1989, 08/05/1990 y 08/11/1990, 26/11/1990 or 28/05/1991, just to mention some of the most recent ones [...] Article 1908 paragraph 2 [...] establishes a case of liability, with a clear objective character, due to the risk generated [...]"] Online available at the Spanish Ministry of Environment website <http://www.mma.es/normativa/jurisp/sent_IV_0010.htm> (Date accessed 03/07/2002).

enhancements and also due to the 'principle of earning profit', by which the person who obtains benefit must also assume the consequences of the activity undertaken, thus balancing the two components. The consequence of this will be the shift on the burden of proof.[675]

This theory of risk may be very useful in the case of GNSS, and especially for Galileo, should a private company be established to deal with commercialization of the service. As already shown, one of the services that will be offered by Galileo is free of charge, and subsequently/presumably a service to be provided outside of any contract. Therefore, the extra-contractual civil regime enters the scene and may play an important role in determining the liability of a private Galileo entity.

Under the CCF, tort liability is covered in Articles 1382 to 1386,[676] and the requisites for its applicability are (similarly to the Spanish legal framework) damage, fault, and the necessary causal link.[677] French courts have also developed and widened the scope of applicability of liability, thus significantly reducing the requisites of proof, and establishing a presumption of proof under Article 1384. In France, the 'dangerous things' idea has been abandoned, with a subsequent strengthening of the protection of injured third parties.[678] As V. Kayser comments, the burden of proof will be more or less strict, depending on whether the damage was caused by a movable or an unmovable. In the case of an accident between an inert thing or a movable with no direct contact, the burden of proof will remain on the victim, while in case of damage caused by a movable making contact with the damaged party, there will be no need for the victim to prove the negligence or faulty act of the defendant.[679]

In Spain, determination of the amount of indemnification for cases of extra-contractual liability is left to the prudent discretion of the corresponding tribunal, and may not be revised on appeal, unless an error is found in the legal basis for the court's decision.[680]

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[675] See Sentence 24/05/1993 of the Spanish Supreme Court, *ibid.*
[676] See CCF, *supra* 589.
[677] See Kayser, *supra* 76, p. 207.
[678] See Kayser, *supra* 76, p. 209 and 210 commenting on the French landmark judgment *Jand'heur.*
[679] See Kayser, *supra* 76, p. 211.
[680] Sentencia Tribunal Supremo núm. 82/2001 (Sala de lo Civil), de 31 enero
Recurso de Casación núm. 203/1996. Jurisdicción: Civil. RJ 2001\537, Septimo.

In concluding this section, it can be said that the success of a suit for damages depends, primarily, on the ability to determine the reality of the caused damage, proof of which corresponds to the person claiming it and despite of the law under which recovery is sought.[681]

4.3 Some Liability Issues Relating to ESA and Galileo

The liability of the ESA with respect to Galileo (whether acting as an international organization or as a private entity) may fall under the scope of applicability of international or domestic legal regimes, as already discussed. The final institutional framework for Galileo is not yet clear, although some authors and studies have suggested a public "Galileo Agency,"[682] presumably within the EU Commission, and a "Private Entity" in charge of the operation of the system and the commercialization of services.[683] As discussed earlier in the description of Galileo, most of the services offered will be paid services – meaning that Galileo will be prepared to accept liability for at least some of the services it provides. In cases where Galileo accepts liability, Dr. von der Dunk proposes a two-tiered regime of liability, similar to the one found in aviation, as the proper regime to apply to actions for damages. Under such a regime, the private operator would cover damages up to a certain maximum monetary amount, and the public entity (*e.g.*, an intergovernmental organization, the Galileo Agency, or the EU Commission) would compensate for all damages above the agreed limit.

What is not clear is the role of the ESA once the Galileo program is operative. Some brief comments will be made here with respect to the ESA Convention. Article IV of Annex I of the Convention establishes the immunities and privileges of the

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[681] Sentencia Audiencia Provincial núm. 88/2001 Almería (Sección 1ª), de 24 marzo
Recurso de Apelación núm. 352/2000. Jurisdicción: Civil. AC 2001\1147, Segundo.

[682] Galileo Agency: Envisaged as a public intergovernmental organization, established by a Council decision. It would be holder of legal personality and would have structural, policy, executive, quasi-legislative, quasi-judiciary and liability/insurance-related functions. Galileo European Multimodal Integrated Navigation User Service (GEMINUS) Study. DG TREN GEMINUS Contract. Report on the Institutional Environment. Annex C to GEMINUS final report, p. 36. Online available at <http://www.genesis-office.org/documents/geminus/docs-pdf/D3_1E_ls_41.pdf> (Date accessed 16/07/2002).

[683] F. G. von der Dunk, "Liability for Satellite Navigation: A nightmare or a Lawyer's Paradise?" Paper read by Dr. von der Dunk given in Copenhagen the 30/05/2002, for the European Navigation Conference 2002 (GNSS 2002). Provided via e-mail, available upon request <rodriguezpablo@hotmail.com>

Organization,[684] which may be waived in all cases where immunity could impede the course of justice. Also important is Article XVII of the Convention, providing for an Arbitration Tribunal for any dispute that may arise, the final award of which shall be final and binding.[685] This article, however, must be read together with Article XXVI of Annex I, which recognizes (without prejudice to the immunities set up in the Convention) the extra-contractual responsibility of the Agency, which will be more particularly decided in the above-mentioned Arbitration Tribunal.[686] Despite these brief comments, it should not be forgotten that the ESA has accepted the Liability Convention of 1972, with all the consequences (as discussed in Chapter II above) this implies for Galileo.

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[684] ESA Convention Annex I Article IV: "The Agency shall have immunity from jurisdiction and execution, except: a) to the extent that it shall, by decision of the Council, have expressly waived such immunity in a particular case; the Council has the duty to waive this immunity in all cases where reliance upon it would impede the course of justice and it can be waived without prejudicing the interests of the Agency; b) in respect of a civil action by a third party for damage arising from an accident caused by a motor vehicle belonging to, or operated on behalf of, the Agency, or in respect of a motor traffic offence involving such a vehicle; c) in respect of an enforcement of an arbitration award made under either Article XXV or Article XXVI; d) in the event of the attachment, pursuant to a decision by the judicial authorities, of the salaries and emoluments owed by the Agency to a staff member." Online available at the ESA website <http://www.esa.int/convention> (Date accessed 15/07/2002).

[685] ESA Convention, Article XVII: "1) Any dispute between two or more Member States, or between any of them and the Agency, concerning the interpretation or application of this Convention or its Annexes, and likewise any dispute referred to in Article XXVI of Annex I, which is not settled by or through the Council, shall, at the request of any party to the dispute, be submitted to arbitration. 2) Unless the parties to the dispute decide otherwise, the arbitration procedure shall be in accordance with this Article and with additional rules to be adopted by the Council by a two-thirds majority of all Member States. 3) The Arbitration Tribunal shall consist of three members. Each party to the dispute shall nominate one arbitrator; the first two arbitrators shall nominate the third arbitrator, who shall be the chairman of the Arbitration Tribunal. The additional rules referred to in paragraph 2 shall determine the procedure to be followed if the nominations have not taken place within a specified time. 4) Member States or the Agency, not being parties to the dispute, may intervene in the proceedings with the consent of the Arbitration Tribunal if it considers that they have a substantial interest in the decision of the case. 5) The Arbitration Tribunal shall determine its seat and establish its own rules of procedure. 6) The award of the Arbitration Tribunal shall be made by a majority of its members, who may not abstain from voting. This award shall be final and binding on all parties to the dispute and no appeal shall lie against it. The parties shall comply with the award without delay. In the event of a dispute as to its meaning or scope, the Arbitration Tribunal shall interpret it at the request of any party to the dispute." <http://www.esa.int/convention> (Date accessed 20/07/2002).

[686] ESA Convention Annex I Article XXVI: Any Member State may submit to the international Arbitration Tribunal referred to in Article XVII of the Convention any dispute: a) arising out of damage caused by the Agency; b) involving any other non-contractual responsibility of the Agency; c) involving the Director General, a staff member or an expert of the Agency and in which the person concerned can claim immunity from jurisdiction under Articles XV, XVI *a* or XVII *a*, if this immunity is not waived in accordance with Article XXI. In such disputes where the claim for immunity from jurisdiction arises under Articles XVI *a* or XVII *a*, the responsibility of the Agency shall in such arbitration be substituted for that of the persons referred to in those Articles. Online available at the ESA website <http://www.esa.int/convention> (Date accessed 20/07/2002).

5. *Legal Issues Relating to the Russian Federation and GLONASS*

Despite the fact that all the international public law already discussed above also applies to the Russian GLONASS system, there are a series of regulations in the Russian Federation that should be taken into account. Under the Space Policy Declaration of April 1993,[687] the first of these regulations is the Law of 1993 on Space Activity,[688] setting up the framework for the development of space activities in Russia. From this legal text, some provisions need to be highlighted. First of all, Article 2 deals with the concept of space activities, in which navigation satellite systems are included.[689] In addition, Section VII of the Law regulates liability aspects of space activities. This section is divided into two articles: Article 29 establishing the responsibility of officials, agents or government agencies in case of violation of the present law or any other legislative acts dealing with space activities,[690] and Article 30 dealing with state liability for damage caused by space activities. It is important to note that under this article the Russian Federation undertakes to pay full compensation for direct damages caused by any space activity, which, in relation to Article 2 above, includes GNSS services. This provision is softened by the second part of paragraph 2, which asserts that in the case of "errors committed at the creation and use of space techniques, liability for damages shall be partly or fully laid upon the appropriate organization and citizens".[691] The rest of the article proceeds essentially to implement the provisions of the Liability Convention.

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[687] On The Priority Of Russian Federation Space Policy (27 April, 1993); online available at <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-1-2-81_e.html> (Date accessed 09/07/2002)

[688] Law of Russian Federation on Space Activity (August 20, 1993). Online available at the Japanese Space Agency website <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-1-2-7/index_e.html> (Date accessed 09/07/2002).

[689] See Law of Russian Federation on Space Activity, *ibid;* Article 2: "1. For purposes of this Law space activity shall be defined as any activity immediately connected with operations to explore and use outer space, including the Moon and other celestial bodies. Space activity shall include: [...] use of navigation, topographical and geodesic satellite systems [...]".

[690] See Law of Russian Federation on Space Activity, *supra* 688; Article 29: "State bodies and their officials, other organizations and their officials, as well as citizens guilty of violation of this Law and other legislative acts governing space activity shall be held responsible in accordance with legislation of Russian Federation."

[691] See Law of Russian Federation on Space Activity, *supra* 688; Article 30.2.

However, in the case of damage suffered within the territory of the Russian Federation only, liability "shall also arise regardless of the fault of the inflictor thereof."[692]

The next relevant regulation is the Decree on Executing Works in Use of the GLONASS System for the Sake of Civil Users of 1995.[693] The Decree confirms, first of all, the commitments of the Russian government towards civil users, and calls for the setting up of a Coordination Council on GLONASS. It also foresees the development of a normative document to govern the process of interaction among the different Russian Federation Ministries in respect of GLONASS operation and user support.

In 1996, the Russian Ministry of Transport and Federal Aviation Authority sent two letters offering GLONASS to a wide segment of the civil global community through ICAO[694] and IMO.[695] Later, in 1997, Decree 1435[696] was approved, thus providing a federal program of using GLONASS for the benefit of civil users. Further, Decree 38-RP of 18 February 1999,[697] was issued, recognizing the dual use of GLONASS, engaging foreign investment for funding the program, and establishing the Russian Space Agency as a general customer of GLONASS, as well as making it responsible for the application and development of GLONASS in the interest of civil users. Also in 1999, a Declaration of The Government of The Russian Federation encourages international cooperation on

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[692] See Law of Russian Federation on Space Activity, *supra* 688; Article 30.3: "Liability for damages inflicted by a space object of Russian Federation within the territory of Russian Federation or outside the jurisdiction of any state, except outer space, shall arise regardless of the fault of the inflictor thereof. If in any place, apart from the Earth's surface, damage has been inflicted on a space object of Russian Federation or on property on board of such object by another space object, the liability of organizations and citizens shall emerge with their being at fault and in proportion to their fault."

[693] The Decree from March 7, 1995 number 237 Moscow "On Executing Works in Use of the GLONASS Global Navigation Satellite System for the Sake of Civil Users": "Ministry of Transportation of the Russian Federation, Ministry of Defence of the Russian Federation, State Committee on the defence-oriented industry, Russian Space Agency and "Internavigatsiya" interdepartmental commission are to set up in the second quarter of 1995 the coordination council on use the GLONASS system by national and foreign civil users." See *supra* 119.

[694] See Addison, Appendix 6, p. 157; *supra* 117.

[695] IMO SN/Circ.187 of 13th of December 1996 Ref. T2/2.07, Recognition of The Global Navigation Satellite System (GLONASS) as a Component of the World-Wide Radionavigation Systemm, see *supra* 120. Also see Kim, *supra* 13.

[696] The Decree of the Government of Russian Federation, of November 15th 1997, No. 1435, Moscow "On Federal aim program of using GLONASS global navigation satellite system for the benefits of civil users". Online available at <http://www.rssi.ru/SFCSIC/english.html> (Unofficial translation) (Date accessed 09/07/2002).

[697] The Decree of the President of the Russian Federation no. 38-rp, 18/02/1999: "[...] to refer the GLONASS global navigation satellites system to space facilities of a dual use, employed for scientific, social economic goals and in the interest of the defence and the security of the Russian Federation [...]" Online available at <http://www.rssi.ru/SFCSIC/english.html> (Unofficial translation) (Date accessed 09/07/2002).

GNSS[698]. Finally, the Russian Government has recently (August 2001) approved a Federal Dedicated Program entitled "Global Navigation System."[699]

Despite all of the above Russian legislation, regarding liability issues, Mr. Kuriamov, Representative of the Russian Federation before the Council of ICAO, has affirmed that the Russian government is not currently prepared to accept liability, either on an international level or on a national level, for damage caused by a failure of GLONASS signals.[700]

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[698] Declaration of The Government of The Russian Federation (29th of March 1999): "In this connection the Government of the Russian Federation approved measures aimed to provide operation of the global navigation satellite system GLONASS in needed complement and concentrate efforts and abilities of concerned ministries and agencies to further improvement of the system. Now the Russian Space Agency is responsible for application and development of GLONASS in the interests of civil users, as well as for international cooperation in this field." Online available at <http://www.rssi.ru/SFCSIC/english.html> (Unofficial translation) (Date accessed 09/07/2002).

[699] See Kulik, *supra* 49: Gov. Dec. 587 at Program budget 23.6 B ruvlos until year 2011, slide 9.

[700] See Kuriamov, *supra* 50.

The issue of liability for GNSS activities has partially been resolved under different regimes established to regulate damage caused by a technology that, although domestically controlled, has extensive global repercussions.

From a public international law perspective, the clearest mechanism relating to liability for GNSS that has been agreed upon is the Liability Convention of 1972. Having thoroughly examined its provisions and historical application, this paper concludes that the Convention does apply to GNSS signals interruptions or errors, and to satellite malfunctions, which result in damage. As discussed earlier, the victim-oriented Convention undoubtedly applies to damage caused either directly, indirectly or remotely. Thus the issue is not, or should not be, a matter of the directness of the damage but rather of causation.

In addition, and in the absence of application of the Liability Convention, the Outer Space Treaty of 1967 could also serve as a means of recovery for those states or entities suffering damage from a GNSS malfunction. However, GNSS liability issues also find a legal basis in well established and recognized principles of international law, examples of which include the following: (a) damage that stems from ultra-hazardous activities; (b) damage caused to third states while exercising one's owns rights; (c) damage covered under those legally binding unilateral statements of states that could give rise to an obligation to warn in the case of imminent danger or damage; and (d) the obligation of satisfactorily providing a service upon which rely many users around the world.

From a domestic law perspective, we have also analyzed several national regimes established by the states providing GNSS signals. In this regard, two avenues for making claims should be noted. First, from a public national law perspective, the easiest method of recovering damages seems to be under laws waiving state-based immunity. Such waiver of immunity is provided for in the U.S. mainly in the Federal Tort Claims Act, and in Europe in Article 288 of the Treaty of Amsterdam (apart from the national mechanisms available to each member state). Second, from a private law perspective, the most promising methods of recovering damages are established under the doctrine of product liability, in both the U.S. and the EU. In this regard, special attention should be paid to

jurisdictional developments and trends, and particularly to those cases that consider electricity, gas, and information as products within the meaning of product liability. Here, most noteworthy will be hints in the decisions for such cases revealing the extent to which their rationales could be enlarged, expanded, or analogized to include GNSS signals.

With respect to waiver of liability under national contractual law and international law, two conclusions can be reached. First, waiver of liability clauses are usually restrictively applied by courts, and rarely will courts accept a clause waiving liability for injuries or damage caused to third parties. Second, such waivers may also be connected to international law for the following two reasons. First, a State that undertakes space activities is internationally responsible and liable under international law both for its own actions and for the actions of any of its public or private entities. Second (and really as a further description of a State's international responsibility), no State can invoke its national law to justify contravention of an international obligation. Keeping these observations in mind, the conclusion is easily and properly reached that *under certain circumstances* a clause in a space-related contract, waiving liability between two private entities of two states, is likely in breach of international law, if those states are parties to the Outer Space Treaty of 1967 and to the Liability Convention of 1972.

Finally, the necessity of solving all GNSS issues at once, through a GNSS international convention, has also been discussed. There appears, however, to be no need for such an endeavour. The remedies currently available, both at the international and domestic levels, are sufficient for the time being. The problem with creating an international convention regarding GNSS is that, especially with respect to international law, States seem to feel more comfortable with current liability regimes, which by substance and practice they are able to apply in a manner best suited to them. In addition, the lack of international judicial tribunals, able to make permanent compulsory and binding decisions, is one of the major shortcomings of current international law – a lacuna that results in numerous breaches of international law to which we all are frequent spectators.

SELECTED BIBLIOGRAPHY

Primary Sources

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1. International Agreements and Conventions

- Charter of the United Nations and Statute of the International Court of Justice, (entered into force 24th October 1945) 16 U.S.T. 1134; <http://www.icj-cij.org/icjwww/ibasicdocuments/ibasictext/ibasicunchArticlehtm> (Date accessed 05/06/2002) and <http://www.icj-cij.org/icjwww/ibasicdocuments/ibasictext/ibasicstatute.htm> (Date accessed 05/06/2002).

- Vienna Convention on the Law of Treaties of 1969 (entered into force 27th January 1980); 1155 U.N.T.S. 331, section 2; <http://www.unog.ch/archives/vienna/vien_69.htm> (Date accessed 02/06/2002).

- The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (entered into force the 10th October 1967); 18 U.S.T. 2410; T.I.A.S. 6347; 610 U.N.T.S. 205; <http://www.oosa.unvienna.org/SpaceLaw/outersptxt.html> (Date accessed 03/06/2002).

- The Convention on International Liability for Damage Caused by Space Objects (entered into force on the 1st September 1972) 24 U.S.T. 2389; T.I.A.S. 7762; 961 U.N.T.S. 187; <http://www.oosa.unvienna.org/SpaceLaw/liabilitytxt.html> (Date accessed 02/06/2002).

- The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (entered into force on 3 December 1968) 672 U.N.T.S. 119; <http://www.oosa.unvienna.org/SpaceLaw/rescuetxt.htm> (Date accessed 09/06/2002).

- Agreement Among the Government of Canada, the Governments of the ESA Member States, the Goverments of Japan, the Russian Federation, and the USA Concerning Cooperation on the Civil International Space Station (not yet in force); *Law of Space Applications (Air and Space Law Applications) Documents and Materials*. Volume II (Jakhu, R. S., IASL, McGill University, Montreal, Canada September 2001), p. 185; <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-2-2-16/index_e.html> (Date accessed 09/06/2002).

- Convention for the Unification of Certain Rules Relating to International Carriage by Air of 1929. Annals of Air & Space Law (1993) XVIII- II, p. 325;

(McGill University; Montreal, Canada)
<http://www.iasl.mcgill.ca/airlaw/private/warsaw/warsaw1929.pdf> (Date accessed 06/06/2002).

- Convention for the for the Unification of Certain Rules for International Carriage by Air done at Montreal 1999 (not yet in force);
<http://www.iata.org/legal/_files/Montreal1999.doc> (Date accessed 06/06/2002).

- INTELSAT Agreement and INTELSAT Operating Agreement Relating to the International Telecommunications Satellite Organization "INTELSAT" 1971 (entered into force 12th of February 1973) 23 U.S.T. 3813; T.I.A.S. (7532) 23 – 3813 (1971)
<http://www.austlii.edu.au/au/other/dfat/treaties/1973/6.html> (Date accessed 11/06/2002).

- ESA Convention, Ref. ISSN 1010-5689;
<http://www.esa.int/convention/basic_4.html#TOP> (Date accessed 15/07/2002).

- Implementing arrangement between the National Institute of Standards and Technology of the Department of Commerce of the United States of America and the Commission of the European Communities for cooperation in the fields of metrology and measurement standards, Official Journal C 347, 03/12/1999 p. 0005 – 0006 (1999/C 347/03); <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/c_347/c_34719991203en00050006.pdf> (Date accessed 27/06/2002).

- International Criminal Court (entered into force the 1st of July 2002)
<http://www.un.org/law/icc/index.html> (Date accessed 04/06/2002).

- World Trade Organization Agreement, Annex 2, Dispute Settlement Understanding on rules and procedures governing the settlement of disputes
<http://www.wto.org/english/tratop_e/dispu_e/dsu_e.htm> All the WTO Agreements can be found at <http://www.wto.org/english/docs_e/legal_e/final_e.htm> (Date accessed 06/08/2002).

- Paris Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960; <http://www.iaea.or.at/worldatom/Documents/Infcircs/1996/inf500.shtml> (Date accessed 06/06/2002).

- Vienna Convention on Civil Liability for Nuclear Damage of 1963 (entered into force on November the 12th 1977);
<http://www.iaea.or.at/worldatom/Documents/Infcircs/1996/inf500.shtml> (Date accessed 06/06/2002).

- 1997 Protocol to the Vienna Convention of 1963 imposing strict liability Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage;

<http://www.iaea.or.at/worldatom/Documents/Legal/protamend.shtml> (Date accessed 06/06/2002).

- European Convention on State Immunity of 1972; <http://conventions.coe.int/treaty/en/Treaties/Html/074.htm> (Date accessed 05/06/2002).

- The North Atlantic Treaty of 1949; <http://www.nato.int/docu/basictxt/treaty.htm> (Date accessed 23/06/2002).

- UN International Law Commission, Draft Articles on The Responsibility of States for Internationally Wrongful Acts adopted in November 2001 by the ILC at its 53rd Session Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10 (A/56/10) chap. IV. E. 1.; <http://www.un.org/law/ilc/texts/State_responsibility/responsibilityfra.htm> (date accessed 04/06/2002).

- UN ILC, Draft Articles on Prevention of Transboundary Damage from Hazardous Activities, adopted in November 2001 by the ILC at its 53rd Session Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10 (A/56/10) chap. E.1; <http://www.un.org/law/ilc/texts/prevention/preventionfra.htm> (Date accessed 04/06/2002).

- UN ILC, Draft Articles on Jurisdictional Immunities of States and Their Property; <http://www.un.org/law/ilc/texts/jimmfra.htm> (date accessed 05/06/2002).

2. United Nations Legislation and Related Documents

- UNGA Resolution 1348 (XIII) of 1958; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_13_1348.html> (Date accessed 14/06/2002).

- UNGA Resolution 1472 (XIV) 1959; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_14_1472.html> (Date accessed 09/06/2002).

- UNGA Resolution 1802 (XVII) of December 11th 1962; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_17_1802.html> (Date accessed 09/06/2002).

- UN General Assembly Resolution 1962 (XVIII) on the Declaration of Principles Governing the Activities of States in the Exploration and Use of Outer Space, referred to international liability on 24th December 1963, General Assembly 18th Session.

- UNGA Resolution 2130 (XX) of 21st December 1965; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_20_2130.html> (Date accessed 09/06/2002).

- UNGA Resolution 2222 (XXI) of 19th December 1966; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_21_2222.html> (Date accessed 09/06/2002).

- UNGA Resolution 2260 (XXII) of the 6th November 1967, General Assembly 22nd Session.

- UNGA resolution 1963 (XVIII) of 1963; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_18_1963.html> (Date accessed 09/06/2002).

- UNGA Resolution 2345 (XXII) 1967; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_22_2345.html> (Date accessed 09/06/2002).

- UNGA Resolution 2453B (XXIII) of 1968; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_23_2453.html> (Date accessed 09/06/2002).

- UNGA Resolution 2601B (XXIV) of 1969; at<http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_24_2601.htm l> (Date accessed 09/06/2002).

- UNGA Resolution 2733B (XXV) of 1970; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_25_2733.html> (Date accessed 09/06/2002).

- UNGA Resolution 2777 (XXVI) of 29th November 1971; <http://www.oosa.unvienna.org/SpaceLaw/gares/html/gares_26_2777.html> (Date accessed 09/06/2002).

- UN Doc. A/4141.

- UN Doc. A/AC105/PV. 95.

- UN Doc. A/AC.105/c.2/SR 1.

- UN Doc. A/AC.105/c.2/SR 29-37.

- UN Doc. A/AC.105/c.2/SR 38.

- UN Doc. A/AC.105/c.2/ SR 48.

- UN Doc. A/AC.105/c.2/SR 50.
- UN Doc. A/AC.105/c.2/SR 77.
- UN Doc. A/AC.105/c.2/SR 86.
- UN Doc. A/AC.105/c.2/SR 99.
- UN Doc. A/AC.105/c.2/L.7/Rev. 1.
- UN Doc. A/AC.105/c.2/L. 7, Report 12, Annex I, 10, introd. SR. 25.
- UN Doc. A/AC.105/L.4 Report 6.
- UN Doc. A/AC.105/L.5 Report 12, I.
- UN Doc. A/AC.105/c.2/L. 19.
- UN Doc. A/AC.105/L 34 Report 45 I, p. 41.
- UN Doc. A/AC.105/L.61 & Corr. 1, Report 58, Annex II, 31.
- UN Doc. A/AC.105/771 (2001) United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems (Kuala Lumpur, 20-24 August 2001). <http://www.oosa.unvienna.org/Reports/AC105_771E.pdf > (Date accessed 16/04/2002).
- UN Doc. A/AC.105/L.237 Provisional Agenda of COPUOS for the 45th session, 5-14 June 2002. <http://www.oosa.unvienna.org/Reports/AC105_L237E.pdf> (Date accessed 16/07/2002).
- UNISPACE Report 1982 on *The Geostationary Satellite Orbit*; edited by K. -H. Bockstiegel & M. Benko Space Law, Basic Documents, Institute of Air & Space Law at Cologne University, Vol. 1/1 B.IV.2 and B.IV.1 (Drodrecht / Boston / London: Martinus Nijhoff Publishers Medium, 1996).
- ICAO Assembly Resolution A32-20; <http://www.icao.int/icao/en/res/a32_20.htm> (Date accessed 16/07/2002).
- ICAO Doc. A 32-WP/24, Appendix A. Charter on the Rights and Obligations of States Relating to GNSS Services; <http://www.icao.int/icao/en/res/a32_19.htm> (Date accessed 16/07/2002).
- IMO Resolution A.815 (19): Worldwide Navigation System.
- IMO Resolution A.860 (20): Maritime policy for a future global navigation satellite system (GNSS); 22nd Assembly: 19-30 November 2001.

- IMO Resolution A.915 (22) Revised maritime policy and requirements for a future global navigation satellite system (GNSS); <http://www.imo.org/home.asp> (Date accessed 16/07/2002).

- IMO SN/Circ. 182, of 13th of June 1996 (Ref. T2/2. 07) Recognition of the Global Positioning System Standard Position Service (GPS-SPS) as a Component of the Worldwide Radionavigation System.

- IMO SN/Circ.187, of 13th of December 1996 (Ref. T2/2.07), Recognition of The Global Navigation Satellite System (GLONASS) as a Component of the Worldwide Radionavigation System.

- Year Book of the International Law Commission 1983 Vol. I. Year Book of the International Law Commission 1983 Vol. I (New York: A/CN.4/SER. A/1983 United Nations, 1984)

3. Domestic Legislations and Related Documents

United States

- United States Constitution of 1787; Online available at <http://www.archives.gov/exhibit_hall/charters_of_freedom/constitution/constitution_transcription.html> (Date accessed 03/06/2002).

- US Code, Title 10, Armed Forces; Subtitle A, General Military Law; Part IV, Service, Supply, and Procurement. Chapter 136: Provisions Relating to Specific Programs Sec. 2281. Global Positioning System; <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC2281> (Date accessed: 08/07/2002).

- U.S. Federal Tort Claims Act. U.S. Code Title 28, PArticle VI, Chapter 171; 28 U.S.C. 1346 (b); 28 U.S.C. 2671 *et seq.*; <http://www.access.gpo.gov/uscode/title28/partvi_chapter171_.html> (Last updated 08/05/2002) (Date accessed 23/06/2002).

- Suits in Admiralty Act; U.S.C. 46A Appendix, Chapter 19A, 20 and 22. <http://www.access.gpo.gov/uscode/title46a/46a_14_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

- Death on the High Seas Act; U.S.C. Title 46 Appendix, Chapter 21, Section 761 et seq. <http://www.access.gpo.gov/uscode/title46a/46a_16_.html> (Last updated 13th August 2001) (Date accessed 24/06/2002).

- Foreign Claims Act,10 U.S.C., Subtitle A part IV, Chapter 163, section 2734; <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC2734> (Last updated 08/05/2002) (Date accessed 25/06/2002).

- Military Claims Act.10 U.S.C., Subtitle A part IV, Chapter 163, sections 2731 et seq. <http://www.access.gpo.gov/uscode/title10/subtitlea_partiv_chapter163_.html> (Last updated 08/05/2002) (Date accessed 25/06/2002).

- U.S. Uniform Commercial Code (30th Ed. 1994) Official Text with Comments. West Publishing. The American Law Institute, 4025 Chestnut Street, Philadelphia, Penn. 19104; and the National Conference of Commissioners on Uniform State Laws. 676 North St. Clair Street, Suite 1700, Chicago, Ill. 60611.

- National Aeronautics and Space Act of 1958; <http://www.hq.nasa.gov/office/pao/History/spaceact.html> (Date accessed 08/07/2002).

- The U.S. 2001 Federal Radionavigation Sytems, Published by the U.S. Department of Defence and the Department of Transportation, DoT-VNTSC-RSPA-01-3.1/DoD-4650.5; <http://www.igeb.gov/FRS2001.pdf > (Date accessed 04/02/2002).

- J. Y. Kim, Senior Policy Analyst, Office of Space Commercialization, U.S. Department of Commerce, November/December 2000. <http://www.igeb.gov/outreach/iberia-main.ppt> (Date accessed 08/07/2002).

- J. Y. Kim, "The Global Positioning System. A Worldwide Information Utility" Office of Space Commercialisation, U.S. Department of Commerce, (April 11, 2002) PowerPoint presentation; <http://www.ta.doc.gov/space/library/speeches/2002-04-11-AMRAD.ppt> (Date accessed 14/07/2002).

- Statement by the President regarding the United States' decision to stop degrading Global Positioning System Accuracy; <http://gps.faa.gov/gpsbasics/PresPolicy-text.htm#1> (Date accessed 08/07/2002).

- Annual Report to the President and the Congress. William S. Cohen, Secretary of Defence Report of the Secretary of Defence to the President and the Council Online; <http://www.defenselink.mil/execsec/adr2001/adr2001.pdf> (Date accessed (08/07/2002).

- The White House, Office of Science and Technology Policy, National Security Council, For Immediate Release, March 29, 1996 Contact: (202) 456-6020, Fact Sheet U.S. Global Positioning System Policy, March 29, 1996; 1996 "U.S. Policy Statement on the GPS", Annals of Air & Space Law Vol. XXII-II (1997), p. 457 (McGill University; Montreal, Canada) <http://www.ostp.gov/NSTC/html/pdd6.html> (Date accessed 08/07/2002).

- R. Braibanti and J. Y. Kim, "GPS-Galileo Negotiations: Commercial Issues at Stake" Briefing to the U.S. GPS Industry Council, Sunnyvale, California, March the 21st 2002. <http://www.igeb.gov/outreach/USGIC-presentation-final.ppt> (Date accessed 10/07/2002).

- Fact Sheet U.S. Global Positioning System Policy, May 1, 2000 Statement by the U.S. President Regarding the United States' Decision to Stop Degrading Global Positioning System Accuracy; <http://gps.faa.gov/GPSbasics/index.htm> (Date accessed 23/06/2002).

- U.S. Department of Justice Attorneys Manual [Hereinafter DoJ USAM], 4-5.100, Tort Litigation, Generally: <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/5mciv.htm#4-5.100> (Date accessed 23/06/2002).

- U.S. DoJ USAM Civil Resource Manual 30, Immunity of the U.S. from suit, absent express consent; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00030.htm> (November 1998) (Date accessed 23/06/2002).

- U.S. DoJ USAM Civil Resource Manual 31, Consent to be sued is strictly constructed; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00030.htm> (November 1998) (Date accessed 23/06/2002).

- U.S. DoJ USAM Civil Resource Manual 32, Government Agencies are not Subject to Suit, Absent Statutory Waiver of Immunity; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00032.htm> (November 1998) (Date accessed 23/06/2002).

- U.S. DoJ USAM Civil Resource Manual 33, Immunity of Government Officers Sued as Individuals for Official Acts; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00033.htm> (November 1998) (Date accessed 23/06/2002).

- U.S. DoJ USAM Civil Resource Manual 72, Principles of Contract Interpretation; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00072.htm> (November 1998) (Date accessed 17/06/2002).

- U.S. DoJ USAM Civil Resource Manual 73, Ambiguities; <http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title4/civ00073.htm> (November 1998) (Date accessed 17/06/2002).

- 107th CONGRESS, 1st Session, U.S. H. J. Res. 62; <http://rs9.loc.gov/cgi-bin/query/C?c107:./temp/~c1077Tsc7z > (Date accessed 23/06/2002).

- U.S. House of Representatives, Committee on Transport and Infrastructure. Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR 21). Conference Report, Title IV on Family Assistance; <http://www.house.gov/transportation/aviation/issues/air21conf/Title4.pdf> (Date accessed 24/06/2002).

- Restatement of the Law Second, Torts. (St. Paul, Minnesota: American Law Institute. American Law Institute Publishers, 1965-). Section 323.

- Restatement of the Law Third, Torts. (St. Paul, MN.: The American Law Institute, American Law Institute Publishers, 1998) Section 5.

- The American Law Institute, Torts 3d – Products Liability Cumulative Annual Supplement. For use in 2002. Reporting Cases from July 1984 Through June 2001that cite the Restatement of the Law Second, Torts 2d sect. 402A and 402B and Restatement of the Law Third, Torts: Product Liability Article 1 to End. American Law Institute Publishers (2002).

- Federal Aviation Administration Regulations § 91.103; <http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/14cfr91_00.html> (Last updated 18/06/2002; date accessed 20/06/2002).

- FAA Regulations Chapter 9, Aeronautical Charts and Related Publications; <http://www.faa.gov/ATpubs/AIM/chap9toc.htm> (Last updated 21/ 02/2002 and Date accessed 20/06/2002).

European Union and Member States

- The Treaty establishing the European Coal and Steel Community (ECSC) was signed in Paris on 18 April 1951. <http://europa.eu.int/ecsc/index_en.htm> (Date accessed 26/06/2002).

- Treaty of Amsterdam of 1997 or Treaty on European Union as amended by the Treaty of Amsterdam, establishing the provisions by which the Treaties of the Communities are amended, as well as some considerations on policy and cooperation. Official Journal [Hereinafter OJ] C 340, 10.11.1997, pp. 145-172. <http://www.europa.eu.int/eur-lex/en/treaties/dat/eu_cons_treaty_en.pdf> (Date accessed 26/06/2002).

- Treaty of the European Community as amended by the Treaty of Amsterdam, OJ C 340, 10.11.1997, p 173-308. Online available at <http://www.europa.eu.int/eur-lex/en/treaties/dat/ec_cons_treaty_en.pdf> (Date accessed 26/06/2002).

- Protocol on the Statute of the Tribunal of Justice of the European Communities signed at Brussels on 17 April 1957, as last amended by Article 6 III (3) (c) of the Treaty of

Amsterdam, <http://curia.eu.int/en/txts/acting/statut.htm> (Date accessed 26/06/2002).

- Statutes of Tribunal of Justice of the European Communities; <http://curia.eu.int/en/txts/acting/statut.htm> (Date accessed 26/06/2002).

- Agreement between the European Community, the European Space Agency and the European Organization for the Safety of Air Navigation on a European Contribution to the development of a global navigation satellite system (GNSS) EU OJ L 194 10/07/1998, p. 15; <http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_194/l_19419980710en00160024.pdf> (date accessed 10/07/2002).

- Council Directive 85/374/EEC of July the 25th 1985, on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products. OJ L 210, 07/08/1985; <http://europa.eu.int/comm/consumers/policy/developments/prod_liab/pl01_en.pdf> (Date accessed 20/06/2002).

- Council Resolution of 24 October 1994 on telematics in the transport sector OJ C 309, 05/11/1994 p. 0001 – 0002 (94/C 309/01); <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31994Y1105(01)&model=guichett> (Date accessed 27/06/2002).

- Council Resolution of 19 December 1994 on the European contribution to the development of a Global Navigation Satellite System (GNSS) OJ C 379 31.12.1994 p.2. <http://www.europa.eu.int/eur-lex/en/lif/reg/en_register_0705.html> (Date accessed 27/06/2002).

- Council Resolution of 28 September 1995 on the deployment of telematics in the road transport sector, OJ C 264, 11/10/1995, p. 0001 – 0003; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31995Y1011(01)&model=guichett> (Date accessed 27/06/2002).

- Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system, OJ L 235 17.09.1996 p.6; <http://www.europa.eu.int/eur-lex/en/lif/reg/en_register_1360.html> (date accessed 27/06/2002).

- Council Directive 96/98/EC of 20 December 1996 on marine equipment Official Journal L 046, 17/02/1997 P. 0025 – 0056; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31996L0098&model=guichett> (Date accessed 27/06/2002).

- Council Resolution of 17 June 1997, on the development of telematics in road transport, in particular with respect to electronic fee collection, OJ C 194 25.06.1997, p. 5-7; online at

<http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997Y0625(01)&model=guichett> (Date accessed 08/08/2002)

- EU Council Resolution of 19 July 1999, on the involvement of Europe in a new generation of satellite navigation services – Galileo- Definition phase. (1999/C 221/01) OJ C221/ 1, p. I, 03/08/1999. <http://www.genesis-office.org/documents/990617%20Resolution%20Galileo-EN.pdf> (Date accessed 10/07/2002).

- Council Regulation (EC) No. 876/2002 of May 21 2002, Setting up the Galileo Joint Undertaking, OJ L 138/1 (28/05/2002); <http://www.europa.eu.int/comm/energy_transport/library/gal_r876_2002_en.pdf> (Date accessed 10/07/2002).

- Council Conclusions on Galileo, 2420th Council Meeting, 7282/02 (Presse 78) Brussels on the 26/03/2002; <http://www.europa.eu.int/comm/energy_transport/library/gal_council_concl_03_2002_en.pdf> (Date accessed 09/07/2002).

- Commission Directive 97/15/EC of 25 March 1997 adopting Eurocontrol standards and amending Council Directive 93/65/EEC on the definition and use of compatible technical specifications for the procurement of air- traffic-management equipment and systems (Text with EEA relevance) OJ L 095, 10/04/1997 P. 0016 – 0018; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997L0015&model=guichett> (Date accessed 27/06/2002).

- Commission of the European Communities, Green Paper on "Liability for defective products", Brussels 28.07.1999 COM (1999) 396 final; <http://europa.eu.int/comm/internal_market/en/update/consumer/greenen.pdf> (Date accessed 29/06/2002).

- The Analyses of the Replies to the Commission Green Paper on Product Liability; <http://europa.eu.int/comm/internal_market/en/goods/liability/analysis.pdf> (Date accessed 29/06/2002).

- 1999/569/EC: Commission Decision of 28 July 1999 on the basic parameters for the command-and-control and signalling subsystem relating to the trans-European high-speed rail system (notified under document number C (1999) 2475) - (Text with EEA relevance) OJ L 216 14.08.1999, p.23; online available <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/l_216/l_21619990814en00230023.pdf> (Date accessed 27/06/2002)

- Commission of the European Communities, 08.03.2000 COM (2000) 86 Final. Communication from the Commission to the Council, the European Parliament, the Economic and Social committee and the Committee of the Regions. 'The European Positions for the World Radiocommunications Conference 2000 (WRC-2000).'

<http://www.genesis-office.org/documents/CMR%202000%20en.pdf> (Date accessed 10/07/2002).

- Commission Regulation (EC) No 2082/2000 of 6 September 2000 adopting Eurocontrol standards and amending Council Directive 93/65/EEC, OJ L 254 09.10.2000, p.1; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32000R2082&model=guichett> (Date accessed 27/06/2002).

- Commission Decision of 22 September 2000 on the application of Article 3(3)(e) of Directive 1999/5/EC to marine radio communication equipment intended to be fitted to seagoing non-SOLAS vessels and which is intended to participate in the global maritime distress and safety system (GMDSS) and not covered by Council Directive 96/98/EC on marine equipment (notified under document number C (2000) 2719) (Text with EEA relevance) (2000/638/EC) OJ L 269, 21/10/2000 P. 0052 – 0053. <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32000D0638&model=guichett> (Date accessed 27/06/2002).

- Communication from the Commission to the Council and the European Parliament: 'Europe and Space: Turning to a new chapter.' Commission of the European Communities, Brussels, 27.09. 2000. COM (2000) 597 final; online at <http://europa.eu.int/eur-lex/en/com/cnc/2000/com2000_0597en02.pdf> (Date accessed 27/06/2002)

- 2000/761/EC: Commission Decision of 16 November 2000 defining the specifications of projects of common interest identified in the sector of the trans-European energy networks by Decision No 1254/96/EC of the European Parliament and of the Council (notified under document number C (2000) 2683 (Text with EEA relevance) OJ L 305 06.12.2000, p.22 - 31; online available at <http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_305/l_30520001206en00220031.pdf> (Date accessed 27/06/2002)

- Commission of the European Communities. Brussels 22.11.2000 COM (2000) 750 final. Commission Communication to the European Parliament and the Council on Galileo; <http://www.europa.eu.int/comm/energy_transport/library/gal_com_2000_750_en.pdf> (Date accessed 08/07/2002).

- Commission Decision of 21 March 2001 on the basic parameters of the command-control and signalling subsystem of the trans-European high-speed rail system referred to as "ERTMS characteristics" in Annex II(3) to Directive 96/48/EC (notified under document number C(2001) 746) OJ L 093 , 03/04/2001 P. 0053 - 0056 (2001/260/EC); <http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_093/l_09320010403en00530056.pdf> (Date accessed 27/06/2002).

- Commission Recommendation of 21 March 2001 on the basic parameters of the trans-European high-speed rail system referred to in Article 5(3)(b) of Directive 96/48/EC on the interoperability of the trans-European high-speed rail system, OJ L 100, 11/04/2001 P. 0017– 0026 (2001/290/EC) <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/c_347/c_34719991203en00050006.pdf> (Date accessed 27/06/2002).

- EU Commission, Mission High Level Definition of April 3rd 2001; <http://europa.eu.int/comm/energy_transport/library/galileo_hld_v2_03_04_01.pdf> (Date accessed 10/07/2002).

- Commission Recommendation of 4 July 2001 on the development of a legal and business framework for participation of the private sector in deploying telematics-based Traffic and Travel Information (TTI) services in Europe (Text with EEA relevance) (notified under document number C (2001) 1102) OJ L 199, 24/07/2001 P. 0020 – 0022; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32001H0551&model=guichett> (Date accessed 27/06/2002).

- Commission Directive 2001/53/EC of 10 July 2001 amending Council Directive 96/98/EC on marine equipment (Text with EEA relevance) OJ L 204, 28/07/2001 P. 0001 – 0028; <http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_204/l_20420010728en00010028.pdf> (Date accessed 27/06/2002).

- Commission of the European Communities White Paper, "European Transport Policy for 2010: Time to decide." COM (2001) 370, Brussels 12 Sept 2001. <http://europa.eu.int/comm/energy_transport/library/lb_texte_complet_en.pdf> (Date accessed 27/06/2002).

- EU Commission, Directorate General of Energy and Transport. 'The Galileo Frequency Structure and Signal Design' (2001) <http://www.europa.eu.int/comm/energy_transport/library/gal_stf_final_paper.pdf> (Date accessed 05/02/2002).

- Technical documents of the EU Commission "The European Dependence on U.S.-GPS and the Galileo Initiative" (2001); <http://www.europa.eu.int/comm/energy_transport/library/gal_european_dependence_on_gps_rev22.pdf> (Date accessed 12/07/2002).

- Information Note of the European Commission. Directorate General for Energy and Transport. "Galileo. An imperative for Europe" (2002) <http://www.europa.eu.int/comm/energy_transport/en/gal_doc_en.html#top> (Date accessed 04/02/2002).

- ESA/EU Commission Brochure "Galileo, The European Program for Global Navigation Services." (May 2002); <http://ravel.esrin.esa.it/docs/GalileoBrochure.pdf> (Date accessed 10/07/2002).

- Commission Regulation (EC) No 980/2002 of 4 June 2002 amending Regulation (EC) No 2082/2000, adopting Eurocontrol standards (Text with EEA relevance) OJ L 150 , 08/06/2002 P. 0038 – 0043; <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32002R0980&model=guichett> (Date accessed 27/06/2002).

- Decision No 1336/97/EC of the European Parliament and of the Council of 17 June 1997 on a series of guidelines for trans-European telecommunications networks OJ L 183 11.07.1997 p.12 – 20; online at <http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997D1336&model=guichett> (Date accessed 27/06/2002).

- Directive 1999/34/EC of the European Parliament and of the Council of the 10th of May, OJ 1999 L 141/20, p. 20. <http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/l_141/l_14119990604en00200021.pdf> (Date accessed 29/06/2002).

- Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, OJ L 110 20.04.2001, p.1 – 27; online at <http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_110/l_11020010420en00010027.pdf> (Date accessed 27/06/2002).

- Constitution Española de 1978 [Constitution of Spain of 1978] <http://www.congreso.es/funciones/constitucion/titulo_3_cap_3.htm> (Date accessed 06/07/2002).

- Código Civil Español de 1889 [Spanish Civil Code]; <http://www.igsap.map.es/cia/dispo/ccivilindiceg.htm> (Date accessed 28/06/2002) <http://europa.eu.int/comm/consumers/policy/developments/prod_liab/pl01_en.pdf> (Date accessed 29/06/2002).

- Ley General 26/84 de 19 de julio, para la Protección de Consumidores y Usuarios <http://www.consumo-inc.es/guiacons/interior/otrosdocumentos/ley2684/Ley26-84ingles.htm> (Date accessed 01/07/2002).

- Ley 30/92, de 26 de noviembre, de Régimen Jurídico de las Administraciones Públicas y del Procedimiento Administrativo Común (Parte III) (B.O.E. 27.11.92) – <http://www.igsap.map.es/cia/dispo/l30-92.htm> (Last updated 10/06/2002) (Date accessed 27/06/2002).

- Ley 22/94 de 6 de julio, de Responsabilidad Civil por Productos Defectuosos (Boletín Oficial del Estado No 161 of 7 July 1994, p. 21737 et seq.); <http://www.consumo-inc.es/guiacons/guia.htm> (Date accessed 01/07/2002).

- French Civil Code; <http://www.legifrance.gouv.fr/html/frame_codes1.htm> (date accessed 28/06/2002).

- Law No 98-389 of 19 May 1998 on liability for defective products, JORF of 21 May 1998, p. 7744 CCF, Articles 1386-1 to 1386-18, insérés par Loi n° 98-389 du 19 mai 1998, Journal Officiel du 21 mai 1998; <http://www.legifrance.gouv.fr/html/frame_codes1.htm> (Date accessed 02/07/2002).

Russian Federation

- Russian Federation Constitution of 1993.<http://www.uni-wuerzburg.de/law/rs00000_.html> (Date accessed 03/06/2002).

- On The Priority Of Russian Federation Space Policy (27 April, 1993); <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-1-2-81_e.html> (Date accessed 09/07/2002).

- Law of Russian Federation on Space Activity (August 20, 1993). <http://www.nasda.go.jp/data_lib/Space_Law/Chapter_4/4-1-2-7/index_e.html> (Date accessed 09/07/2002).

- The Government of the Russian Federation. The Decree from March 7, 1995 number 237, Moscow "On Executing Works in Use of the GLONASS Global Navigation Satellite System for the Sake of Civil Users". <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

- The Decree of the Government of Russian Federation, of November 15th 1997, No. 1435, Moscow "On Federal aim program of using GLONASS global navigation satellite system for the benefits of civil users". <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

- The Decree of the President of the Russian Federation no. 38-rp, 18/02/1999; <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

- Declaration of The Government of The Russian Federation (29th of March 1999): Online available at <http://www.rssi.ru/SFCSIC/english.html> (Date accessed 09/07/2002).

4. Case law

International case law (PCIJ/ICJ)

- *Eastern Carelia* case (1923) PCIJ, Ser B, No 5 bb.
- *Corfu Channel* case (UK v. Albania) (1949) ICJ 4.
- Asylum case (Colombia v. Peru) (1950) ICJ 266.
- *North Sea Continental Shelf* Case (Federal Republic of Germany / Denmark; Federal Republic of Germany / Netherlands) (1969) ICJ 3.
- Case Concerning the *Barcelona Traction*, Light and Power Company, Limited (New Application: 1962) (Belgium v. Spain) (1970) ICJ 3.
- *Nuclear Tests* Cases (Australia v. France and New Zealand v. France) (1974) ICJ 253.
- *Frontier Dispute* case (Burkina Faso v. Mali) (1986) ICJ 554.
- *Nicaragua v. United States* (The Merits) (1986) ICJ 14.
- *New Zealand v. France* (1995) ICJ 288.

National case law

a) Common Law Cases

- *Ryland v. Fletcher* 3 L.R.E. & I App. 330 (House of Lords 1868).
- *McPherson v. Buick Motor Co.* 217 N.Y. 382 (N.Y. 1912).
- *McPherson v. Buick* 217 N.Y. 382, 395 (1916).
- *Larson v. Domestic and Foreign Corporation* (1949) 337 U.S. 682.
- *US v. Spelar* 338 U.S. 217 (1949).
- *Feres v. United States*, 340 U.S. 135 (1950).
- *Sei Fuji v. State of California* 38 Cal (2nd) 718 (1952).
- *Johnson v. Coca Cola Bottling Co. of Willmar* 235 Minn. 47 (MINN. 1952).

- *Dalehite v. United States* 346 U.S. 15 (1953).
- *Indian Towing Co. v. United States* 350 U.S. 61 (1955).
- *Henningen v. Bloomfield Motors* 161 A. 2d 69 (N.J. 1960).
- *Berg v. Reaction Motors Division, Thiokol Chemical Corp.* 37 N.J. 396 (1962).
- *Greenman v. Yuba Power* 377 P. 2d 897 (CAL. 1963).
- *Swain v. Boeing Airplane Co.* 337 F.2d 940 (C.A.N.Y. 1964).
- *Lux Art Van Service, Inc. v. Pollard* 344 F.2d 883 (C.A. Ariz. 1965).
- *Ingham v. Eastern Airlines* 373 F. 2d 227 (C.A.N.Y. 1967).
- *Smith v. Lockheed Propulsion Co.* 247 Cal.App.2d 774 (Cal.App.4.Dist.) (1967).
- *Smith v. Lockheed Propulsion Co.* 247 Cal.App.2d 774 (1967).
- *Pigott v. Boeing Co.* 240 So.2d 63 (Miss. 1970).
- *Kasel v. Remington Arms Co.* 24 Cal.App.3d 711 (1972).
- *Executive Jet Aviation v. City of Cleveland* 409 U.S. 249 (1972).
- *Universe Tankships Inc. v. United States* 336 F. Supp. 282 (E.D. Penn. 1972).
- *Bell Aerospace Corp. v. Anderson* 478 S.W. 2d 191 (TEX. 1972).
- *Laird v. Nelms* 406 U.S. 797 (1972).
- *In re Paris Air Crash* of March 3, 1974, 399 F. Supp. 732 (1974).
- *Mike Bruce, ET AL. v Martin Marietta Corporation and Ozark Airlines Inc.* U.S. Court of Appeals, 10th Circuit (1976).
- *Anns and others v. London Borough of Merron*, England (1977).
- *Times Mirror Co. v. Sisk* 593 P.2d 924 (Ariz. C.A. 1978).
- *Stevens v. Cessna Aircraft Co.* 115 Cal.App.3d 431 (California 1981).
- *Aetna Casualty and Surety Corp. v. Jeppesen and Co.* 642 F.2d 339 (C.A.NEV. 1981).
- *Saloomey v. Jeppesen & Co.* (2d Cir.) 707 F.2d 671 (1983).

- *Beattie v. US* 756 F.2d 91 (D.C. Cir. 1984).
- *Miller v. United States* 725 F.2d 1311 (11th Cir. 1984), cert. Denied, 469 U.S. 821 (1984).
- *McPherson v. Union Oil Co.* 628 F. Supp. 265 (S.D. Texas 1985).
- *Fluor Corp. v. Jeppensen & Co.* 170 Cal.App.3d 468 (CAL. 1985).
- *Brocklesby v. United States* (9th Cir.1985) 753 F.2d 794 (1985).
- *Nesselrode v. Executive Beechcraft* 707 S.W.2d 371, 382 (Mo. 1986).
- *Dowd v. Textron, Inc.* 792 F.2d 409 (C.A.4 (Md.) (1986).
- *Tozer v. LTV Corp.* 792 F.2d 403 (C.A.4 (Md.) (1986).
- *Sage v. Fairchild-Swearingen Corporation* 70 N.Y.2d 579 (C.A. N. Y. 1987).
- *Appalachian Insurance v. McDonnell Douglas* 214 Cal.App.3d 1 (Cal. App.4. Dist. 1989).
- *Lloyds of London v. McDonnell Douglas* U.S. Dist. Court Florida, Case 90-833 Civ-ORL-18 and 90-543 (1990).
- *Hayes v. United States* 899 F.2d 438 (5th Cir. 1990).
- *Sisson v. Ruby* 497 U.S. 358 (1990).
- *Smith v. US* 953 F.2d 1116 (9th Cir. 1991).
- *Smith v. US* 507 U.S. 197 (1993).
- *Zicherman v. Korean Airlines Co. Ltd.* 516 U.S. 217 (1996).
- *Dooley v. Korean Airlines*, 524 U.S. 116, 116 (1998).
- *Donoghue v. Stevenson*, L.J. Weber & L.L. I. Grossman, *Comparative Private Air Law, Selected cases readings, cases and materials,* Vol. I, (Montreal: Institute of Air & Space Law, McGill University, Fall 2001), p. 365 paragraphs G-H.

b) European Law and Civil Law cases

- TJEC, Case C-210/96 Gut Springenheide and Tusky [1998] ECR I-4657.
- TJEC, Judgment of the Court (Fifth Chamber) of 29 May 1997. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland. (Case C-300/95) European Court reports 1997, page I-02649.
- EU Court of First Instance, Case T-196/99 (Judgment of 6th December 2001).
- Förde-Reederei GmbH v. Council of the European Union and Commission of the European Communities, Court of First Instance (20h February 2002) Case T-170/00, European Court reports 2002 Page 00000.
- Elliniki Viomichania Oplon AE (EVO) v. Council of the European Union and Commission of the European Communities, Court of First Instance (24th April 2002) Case T-220/96, European Court reports 2002 Page 00000.
- TJEC (Fifth Chamber), 25 April 2002 (Case C-154/00), European Court reports 2002 Page 00000, Commission of the European Communities v Hellenic Republic.
- EU Court of First Instance, Case T-177/01 (Judgment of 3rd May 2002) European Court reports 2002 Page 00000.
- EU Court of First Instance, Case T-365/00 (Judgment of 11th June 2002) Alsace International Car Service SARL (AICS) v. European Parliament, European Court reports 2002 Page 00000.
- TJEC Case C-299/99 Koninklijke Philips Electronics NV and Remington Consumer Products Ltd., Judgement of the Court [18th June 2002].
- TJEC (Fifth Chamber) 25 April 2002 (Case C-52/00), European Court reports 2002 Page 00000. Commission of the European Communities v French Republic.
- Advocate General Jacobs, (Case C-50/00 P) Unión de Pequeños Agricultores v Council of the European Union delivered on the 21st of March 2002; <http://europa.eu.int/servlet/portail/CuriaServlet?curiaLink=%26lang%3DEN%26ident%3D4744%26model%3Ddoc_curia > (Date accessed 26/06/2002).
- Tribunal Supremo-Civil, Sala Primera, Sentencia de 31/01/986, <http://www.mma.es/normativa/jurisp/sent_IV_0001.htm>
- Tribunal Supremo-Civil, Sala Primera, Sentencia de 13/06/1988 <http://www.mma.es/normativa/jurisp/sent_IV_0003.htm>
- Tribunal Supremo-Civil, Sala Primera, Sentencia de 24/05/1993, <http://www.mma.es/normativa/jurisp/sent_IV_0010.htm>

- Sentencia Audiencia Provincial núm. 31/2000 Albacete (Sección 1ª), de 9 marzo Recurso de Apelación núm. 401/1999. Jurisdicción: Civil. AC 2000\1145.

- Sentencia Audiencia Provincial núm. 222/1999 Huesca (Sección Única), de 24 junio. Recurso de Apelación núm. 110/1999. Jurisdicción: Civil.

- Sentencia Audiencia Provincial núm. 149/2000 Almería (Sección 1ª), de 3 mayo, Recurso de Apelación núm. 265/1999. Jurisdicción: Civil AC 2000\3539.

- Sentencia Tribunal Supremo núm. 82/2001 (Sala de lo Civil), de 31 enero Recurso de Casación núm. 203/1996. Jurisdicción: Civil. RJ 2001\537.

- Sentencia Audiencia Provincial núm. 88/2001 Almería (Sección 1ª), de 24 marzo. Recurso de Apelación núm. 352/2000. Jurisdicción: Civil. AC 2001\1147.

- Sentencia Tribunal Supremo núm. 748/2001 (Sala de lo Civil), de 23 julio. Recurso de Casación núm. 1583/1996. Jurisdicción: Civil. AC 1999\1476.

1. Books

- Addison, H., *GNSS Legal framework* (Montreal: Institute of Air & Space Law, McGill University, LL.M. Thesis, 1997).
- Alland, D., *Droit International Public* (Paris: Presses Universitaires de France, 2000)
- Aust, A., *Modern Treaty Law and Practice* (Cambridge: Cambridge University Press, 2000).
- Bosco, J. A., *Liability for outer space activities – A United States perspective* (Montreal: Institute of Air & Space Law, McGill LL.M Thesis, 1985).
- Brownlie, I., *A survey of customary law rules for the protection of the environment* (L.A. Teclaff and A. E. Utton ed., 1974)
- Cassese, A., *International Law* (Oxford: Oxford University Press, 2001).
- Chiavarelli, E., *The KAL 007 Incident: The legal effects of ICAO decisions.* (Montreal: Institute of Air & Space Law, McGill LL.M. Thesis, 1983).
- Cheng, B., *General Principles of Law as Applied by international Courts and Tribunals* (London: Stevens, 1953).
- Cheng, B., *Studies in International Space Law* (Oxford: Clarendon Press, 1997).
- Chŏng, I., *Legal problems involved in the Corfu Channel incident* (Genève: E. Droz, 1959).
- Christol, C.Q., *Space Law: Past, present and future* (Deventer, The Netherlands, Boston: Kluwer Law and Taxation Publishers, 1991).
- Couston, M., *Droit Spatial Économique. Régimes applicables a l'exploitation de l'espace.* (Paris: SIDES 1994).
- Díez-Picazo, L. & Gullón, A., *Sistema de Derecho Civil* (Madrid: Editorial Tecnos S.A., 1992).
- Dupuy, P. M., *Droit International Public* (Paris: Ed. Dalloz, 1995).
- Epps, V., *International Law* (Durham North Carolina: Carolina Academic Press, 2001).

- Forbe, J. M., *Aviation products liability and insurance in the EU legal aspects and insurance of the liability of civil aerospace products manufacturers in the EU, for damage to third parties*. (Deventer: Kluwer Law and Taxation 1994).

- Garner, B. A., Editor in Chief, *Black's Law Dictionary* (St. Paul, Minnesota: West Group, 17th edition, 1999).

- Gorove, S., *Sources and Principles of Space Law* (Wesport, Connecticut, London: pace Law, Development and Scope International Institute of Space Law, 1992).

- Gorove, S., *Developments in Space Law: Issues and Policies* (Drodrecht / Boston / London: Martinus Nijhoff, 1993).

- Gorove, S., *Cases on Space Law. Texts, comments and references* (University of Mississippi: Journal of Space Law, Inc. 1996)

- Hermida, J., *Derecho Espacial Comercial, aspectos internacionales, nacionales y contractuales/Commercial Space Law, international, national and contractual aspects* (Buenos Aires, Argentina: Ediciones de Palma, 1997).

- Hermida, J., *Space Risk and Management* (Montreal: Institute of Air & Space Law, McGill LL.M. Thesis, 2000).

- Hurwitz, B. A., *State Liability for Outer Space Activities in accordance with the 1972 Convention on International Liability for Damage caused by Space Objects* (Utrecht Studies in Air and Space Law, Drodrecht / Boston / London: Martinus Nijhoff Publishers, 1992).

- Jasentuliyana, N., *The Lawmaking process in the United Nations* (Westport, Connecticut, London: Space Law, Development and Scope. International Institute of Space Law, 1992).

- Kayser, V., *Launching Space Objects: Issues of Liability and Future Prospects* (Drodrecht / Boston / London: Space Regulations Library, Kluwer Academic Publishers, 2001).

- Kelsen, H., *Principles of International Law* (New York: Rinehart & Company, Inc., 1966)

- Kopal, V., *Evolution of the doctrine of Space Law* (Westport, Connecticut, London: Space Law, Development and Scope; International Institute of Space Law, 1992).

- Nesgos, P., *National law and commercial activities in outer space,* D.C.L. Thesis, Institute of Air & Space Law (Montreal: McGill University, September 1983).

- O'Brien, J., *International Law* (London / Sydney: Cavendish Publishing Limited, 2001).

- Okowa, P. N., *State Responsibility for Transboundary Air Pollution in International Law* (Oxford: Oxford University Press 2000).

- Ragazzi, M., *The concept of International Obligations Erga Omnes* (Oxford: Clarendon Press 1997).

- Robertson, D.W., Friedell, S. F., and Sturley, M. F., *Admiralty and Maritime Law in the United States* (Durham, North Carolina: Caroline Academic Press, 2001).

- Tancelin, M., *Des Obligations. Contrat et Responsabilité.* (Montreal: Wilson & Lafleur Itee, 1986).

- Treitel, G. H., *The Law of Contract* (London: 10th Ed. Sweet & Maxwell, 1999).

- van Fenema, P., *The 1972 Convention on International Liability for Damage caused by Space Objects* (Montreal: McGill Institute of Air & Space Law, LL.M Thesis, 1973).

- van Traa-Engelman H. L., *Commercial Utilization of Outer Space* (Drodrecht / Boston / London: Martinus Nijhoff Publishers 1993).

2. Articles

- Andries, S., "The European initiative Galileo: A European Contribution to the Global Navigation System (GNSS)" Annals of Air & Space Law Vol. XXV, (McGill University (2000) Montreal, Canada), p. 43.

- J. Bell and A.W. Bradley, "Government Liability – A preliminary assessment in Government liability: A comparative study" (1991) Weber, L. J. and Grossman, L.L.I., Casebook "Comparative Private Air Law, selected readings and materials", Institute of Air and Space Law, McGill University (Fall 2001) Vol. II, p. 339.

- Bockstiegel & Benko, "Disintegration of Cosmos 954 over Canadian Territory in 1978: Canadian Department of External Affairs, Communiqué No. 27 on the Settlement of a Claim, and the Protocol between the Government of Canada and the Government of the USSR of April 2nd 1981"; Space Law, Basic Documents Vol. 1 A.VI.2.

- Bond, L., "The GNSS Safety and Sovereignty Convention of 2000 AD" Public International Air Law, Casebook and Materials, M. Milde 2001 McGill University, p. 140.

- L.S.-B. Bornemann, "This is ground control to Major Tom… your wife would like to sue… but there is nothing we can do… The unlikelihood that the FTCA waives sovereign immunity for torts committed by United States employees in outer space: a

call for pre-emptive legislation." Journal of Air Law & Commerce [Hereinafter JALC] Vol.63 (1997-1998), p. 517.

- Cheng, B. "Article VI of the 1967 Space Treaty Revisited: 'International Responsibility', 'National Activities', and ' The Appropriate State'" (1998) 26:1 Journal of Space Law, 7, p. 9.

- Elder, B., "Free Flight: The future of Air Transportation entering the 21st century" JALC Vol. 62 (1996-97), p. 871.

- Epstein, J.M., "Global Positioning System: Defining the Legal Issues of its expanding Civil Use" JALC Vol. 61:1 (1995), p. 243.

- Gorove, S., "Some comments on the Convention on International Liability for Damage Caused by Space Objects" Proceedings of the 16th Colloquium on the Law of Outer Space (1973), p. 255.

- Henaku, B.D.K., "International Liability of the GNSS Space segment provider" Annals Air & Space Law Vol. XXI-I (McGill University (1996) Montreal, Canada) p. 143.

- Henaku, B. D. K., "Expanding Global Navigation Services: Selected Legal Issues." Commentary Paper, Proceedings of the Workshop on Space Law in the 21st Century, UNISPACE III, Techincal Forum, July 1999, p. 174.

- Hingorani, A., "U.S. Sanctions on the Indo-Russian Rocket-Engine Deal. A subversion of the Missile Technology Control Regime" (1994) Casebook "Law of Space applications (Air and Space Law Applications)" Documents and Materials V. II (Compiled and edited by Ram S. Jakhu with the assistance of J. Hermida) Institute of Air & Space Law, McGill University, Montreal, Canada (September 2001), p. 294.

- Huang, J., "Development of the long-term legal framework for GNSS" Annals of Air & Space Law Vol. XXII-I (McGill University (1997) Montreal, Canada), p. 585.

- Jakhu, R., and Rodriguez Serrano, V., "International Regulation of Radio Frequencies for Space Services", Law of Space Applications (Air and Space Law Applications). Documents and Materials, IASL McGill (September 2001) Vol. I, p. 169.

- Keel, R. C., and Levine, K. B., "U.S. Airlines on course for free flight." JALC Vol. 62 (1997), p. 675.

- Lawter, A. K., "Free Flight or Free Fall?" JALC Vol. 62 (1997), p. 915.

- Maniatis, D., "The Law Governing Liability for Damage Caused by Space Objects: from State Responsibility to Private Entity." Annals of Air & Space Law Vol. XXII-I, (McGill University (1997) Montreal, Canada), p. 374

- Matte, N. M., "Special Aspects of Product Liability in Relation to Space Transportation", Proceedings of an International Colloquium in Cologne 1977, Carl Heimanns Verlag K.G. (1978).

- Milde, M., "Solutions in search of a problem? Legal aspects of the GNSS." Annals of Air & Space Law, Vol. XXII-II, (McGill University (1997) Montreal, Canada), p. 197.

- Mildred, M., "Product Liability and Electromagnetic Fields", Paper produced for the Health and Consumer Protection DG, (November 2001). Online available at <http://europa.eu.int/comm/health/ph/programmes/pollution/conference/speeches/mildred_speech_en.pdf> (Date accessed 29/06/2002).

- Moore, G. M., and Caven, J. D., "Free flight technical requirements and liability issues that may arise for equipment manufacturers", JALC Vol. 62 (1996-1997), p. 687.

- Rajski, J., "Convention on International Damage caused by space Objects. An important step in the development of the international space law. " Proceedings of the 17th IISL Colloquium on the Law of Outer Space of the IAF (1974), p. 254.

- Rutherford, R. T., "Changes in the landscape of products liability law: an analysis of the restatement (third) of Torts", JALC Vol. 63:1 (1997-1998), p. 209.

- Salin, P. A., "An update on GNSS before the next ICAO experts meeting on the legal and technical aspects of the future satellite air navigation systems", Annals of Air & Space Law Vol. XXII-I (1997), (McGill University; Montreal, Canada), p. 505.

- Schmid-Tedd, B., "Best efforts principle and terms of contract in space business" Proceedings of the 31st IISL Colloquium on the Law of Outer Space (1988), p. 336.

- Schultz, R. B., "Application of strict product liability to aeronautical chart publishers" JALC, Vol. 64: 2 (1998/1999), p. 431.

- Shupe, J.D., and Steggerda, T. R., "Toward a more uniform and 'reasonable' approach to products liability litigation: current trends in the adoption of the restatement (third) and its potential impact on aviation litigation." JALC Vol. 66 2000

- Spradling, K. K., "The International Liability Ramifications of the U.S. NAVSTAR Global Positioning System" Proceedings of the 33th Colloquium of the IISL of the International Austrounautical Federation, Published by the American Institute of Aeronautics and Astronautics, Dresden, Germany (October 6-12, 1998), p. 94 A.C.

- Spacone "Strict Liability in the European Union – Not a United States Analog", Roger Williams University Law Review 341 Weber, L. J. and Grossman, L.L.I., Casebook "Comparative Private Air Law, selected readings and materials", Institute of Air and Space Law, McGill University (Fall 2001) Vol. II, p. 142.

- Stepp, J.J., and Aubuchon, M. J., "Flying over troubled waters: the collapse of DOHSA's historic applications to litigation arising from high seas commercial airline accidents." JALC Vol. 65: 4 (1999-2000), p. 805.

- van Dam, R. D., "Recent Developments at the European Organization for the Safety of Air Navigation (EUROCONTROL)" Annals of Air & Space Law, Vol. XXIII, (McGill University (1998) Montreal, Canada), p. 309.

- Vereshchetin, V. S., "International Space Law and Domestic Law: Problems of Interrelations." Journal of Space Law, Vol. 9, Nos. 1 & 2 (1981), p. 31.

- von der Dunk, F. G., "The 1972 Liability Convention, enhancing adherence and effective application" 1998 IISL/ECSL Symposium, The Review of the Status of the Outer Space Treaties, p. 366.

- von der Dunk, F. G. "Liability for Satellite Navigation: A nightmare or a Lawyer's Paradise?" Paper read by Dr. von der Dunk given in Copenhagen the 30/05/2002, for the European Navigation Conference 2002 (GNSS 2002). Provided via e-mail the 20th of June 2002 a lecture given in Copenhagen the 30/05/2002.

3. Miscellaneous

- Charron, J.P., Group Leader, PIM Testing. Field trip of the Institute of Air & Space Law, McGill University to the Canadian Space Agency David Florida Labs, Ottawa (Visit/Interview 15/03/2002).

- Cornelisse, R., Head of the legal section of the Galileo Interim Support Structure (GISS), (e-mail 19/02/2002).

- Esquivel Cocca, M. M., Professor In air and Space Law, on behalf of Professor Cocca, A. A. (e-mail 20/05/2002).

- Ferrazzani, M., ESA's Senior Legal Administrator (e-mail 04/02/2002).

- Harvey, M., IMO (e-mail 17/07/2002).

- Malo Poyatos, A., Telecommunications Engineer, Red Electrica Española, Madrid, Spain. (e-mail 25/02/2002).

- Mantl, L., GISS (GALILEO Interim Support Structure) Regulatory and Legal Issues Section (e-mails 20/02/2002, 21/02/2002, and 07/03/2002).

- Martinez, J., ISO Information Officer (e-mails 20/06/2002 and 21/06/2002).

- Kuriamov, V. P., Representative of the Russian Federation on the Council of ICAO (Interview at ICAO HQ 15/05/2002).

- Price, W. F., Alternate Representative, Air Navigation Commissioner of the U.S. Mission to ICAO, (Interview at ICAO HQ 03/06/2002).

- von der Dunk, F.G., (e-mails 13/05/2002 and 20/06/2002).

- van Fenema, P., (e-mail 13/06/2002).

- Benedicto, J., Dinwiddy, S. E., Gatti, G., Lucas, R., and Lugert, R., "Galileo Satellite System Design and Technology Developments" ESA November 2000 <http://ravel.esrin.esa.it/docs/galileo_world_paper_Dec_2000.pdf> (Date accessed 10/07/2002).

- Blanchette, I., & Dunbar, K. (2000) How Analogies are generated: The Roles of Structural and Superficial Similarity. Memory & Cognition, 28, 108-124. Online available at http://www.psych.mcgill.ca/perpg/fac/dunbar/analogy.html (date accessed 06/06/2002).

- Busics, G., "The present and future role of GNSS in the state border registry: Hungarian experience." PowerPoint Presentation for the Second United Nations/United States of America Regional Workshop on the Use of Global Navigation Satellite Systems, "The Use and Applications of Global Navigation Satellite Systems" Hosted by the Government of Austria and the Austrian Space Agency, Co-sponsored by the European Commission. G/H Halls, Austria Center Vienna, Austria (26 to 30 November 2001) [Hereinafter PowerPoint presentation on GNSS];
<http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker02/sld001.htm> (Date accessed 08/07/2002).

- Canadian Hazardous Products Act (R.S. 1985, c. H-3), Online available at <http://laws.justice.gc.ca/en/H-3/> Updated to August 31, 2001 (Date accessed 06/06/2002).

- Glass, D., "Using GPS for maritime transportation." PowerPoint presentation on GNSS.
<http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker01/sld001.htm> (Date accessed 08/07/2002).

- GEMINUS studies on Galileo; <http://www.genesis-office.org/indexd.htm> (Date accessed 10/07/2002).

- Hlasny, T., "Using GPS for climatology and geoecology." PowerPoint presentation on GNSS. Online available at
<http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker05/sld001.htm> (Date accessed 08/07/2002).

- Huseynov, G., "Designing and planning of aerospace experiments with GPS for monitoring critical environmental zones of Azerbaijan." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker04/sld001.htm> (Date accessed 08/07/2002).

- Iatsouk, V., ICAO Secretariat "Development of ICAO standards for the global navigation satellite system is moving ahead"; <http://www.icao.int/icao/en/jr/5305_ar2.htm> (Date accessed 16/07/2002).

- Legat, K., "APIS - Air Pollution Information System." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session02/speaker05/sld001.htm> (Date accessed 08/07/2002).

- Moore, T., "River level monitoring using GPS heighting" PowerPoint presentation on GNSS; <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker04/sld001.htm> (Date accessed 08/07/2002).

- Nawrocki, J., "Benefit and problems of high precision time: comparison of atomic clocks using GPS." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker04/sld001.htm> (Date accessed 08/07/2002).

- Pozo-Ruz, A., Ribeiro, A., García-Alegre, M. C., García, L., Guinea, D., and Sandoval, F., "Sistema de Posicionamiento Global (GPS): Descripción, Análisis de Errores, Aplicaciones y Futuro", Instituto de Automática Industrial, Consejo Superior de Investigaciones Científicas, 28500 Arganda. Madrid (Spain); <http://www.iai.csic.es/users/gpa/postscript/Pozo-Ruz00a.pdf > (Date accessed 08/07/2002).

- *PricewaterhouseCoopers* study; <http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/01/1637|0|AGED&lg=EN> (Date accessed 10/07/2002).

- Rasher, M. "The use of GPS and mobile mapping for decision-based precision agriculture", PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session03/speaker02/sld001.htm> (Date accessed 08/07/2002).

- Rohde, H., "The introduction of GNSS for maritime purposes." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session08/part_c/speaker02/sld001.htm> (Date accessed 08/07/2002).

- Sledzinski, J., "Satellite navigation systems in geodetic and geodynamic programmes initiated and coordinated by the Central European Initiative (CEI): results and achievements of the long-term international cooperation of 17 CEI countries." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker01/sld001.htm> (Date accessed 08/07/2002).

- Szabady, Z., "Some Hungarian GPS applications in transportation" PowerPoint presentation on GNSS; <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session06/speaker02/sld002.htm> (Date accessed 08/07/2002).

- Vintila, R., "Agriculture monitoring at the parcel scale using GPS and multi-temporal remote sensing data in the framework of the ADAM Project." PowerPoint presentation on GNSS. <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session03/speaker01/sld001.htm> (Date accessed 08/07/2002).

- Weber, R., "GPS and Earth Science." PowerPoint presentation on GNSS; <http://www.oosa.unvienna.org/SAP/act2001/gnss2/presentations/session04/speaker02/sld001.htm> (Date accessed 08/07/2002).

4. Internet Most Visited Sources

- United Nations <www.un.org>

- UN International Court of Justice <www.icj-cij.org>

- UN Office for Outer Space Activities <www.oosa.unvienna.org>

- UN International Law Commission <www.un.org/law/ilc>

- ICAO <www.icao.org>

- European Union <www.europa.eu.int>

- EU Commission's Directorate Generale of Energy and Transport <www.europa.eu.int/comm/energy_transport>

- Galileo <www.genesis-pgm.org> and <www.genesis-office.org>

- U.S. Department of Commerce, Air and Space Commercialisation, <www.home.doc.com>

- U.S. Department of Defense <www.dod.gov>

- U.S. Department of Justice <www.usdoj.gov>
- U.S. Space Command, <www.peterson.af.mil/usspacecom>
- U.S. Government Printing Office <www.access.gpo.gov>
- Cornell Law School, Legal Information Institute <www.law.cornell.edu>
- Westlaw, legal data base <www.lawschool.westlaw.com> [Restricted access]
- LexisNexis, legal data base <www.lexisnexis.com> [Restricted access]
- *Eur-Lex,* legal data base <www.europa.eu.int/eur-lex/en/index.html> [Free access]
- NASA <www.nasa.gov>
- GPS IGEB <www.igeb.gov>
- Russian Space Agency, <www.rosaviakosmos.ru> / <www.rssi.ru>
- European Space Agency <www.esa.int>
- Ministerio de las Administraciones Publicas <www.igsap.map.es>
- Législation Française <www.legifrance.gouv.fr>
- Space Daily; <www.spacedaily.com>
- GPS news <www.gpsworld.com>