

# NEEDS OF AN INTERNATIONAL POLICY AND REGULATION FRAMEWORK FOR OPERATIONAL DEBRIS MITIGATION SYSTEMS

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## ABSTRACT

The lack of a shared definition of space debris, jurisdiction on ownership and legal & policy issues, will affect the operations of future debris removal systems.

The analysis of these items are an essential step for a governance and regulation framework and to draft a set of specific rules to be agreed at national and international level.

All these aspects are very sensitive and they involve constraints in relation to the national sovereignty. The legal uncertainty could induce delay in setting up actions to implement the space debris mitigation measures and the identification of “commercial” actors that could invest and operate in these domains.

## 1 SPACE DEBRIS: SHARED DEFINITION AND RELEVANT LEGAL BASE

'Space debris' means spacecraft or parts thereof that no longer serve any specific purpose including parts of rockets or artificial satellites, or inactive artificial satellites. Spacecraft' means any man-made space object serving a specific purpose, including artificial satellites. Space object means any man-made or natural object in outer space<sup>[1]</sup>.

When a lawyer needs to regulate a particular juridical circumstance or issue, he has to take into account, as first point, a clear and shared definition of such issues in accordance with the reference law.

Especially in international law, where Countries could interpret and regulate legal issues with different methods and with various values and parameters, the matter of definition gains a remarkable importance. Indeed, a shared definition of an element, at an international level, is fundamental to understand how the available legal framework could be applied to it effectively, or, in case of lack of such framework, to help lawyers to define new specific provisions.

As every issue addressed under international law, also “space debris” need a juridical definition, as a first step in order to verify the potential application of

Space Law<sup>[2]</sup>. Nowadays, the growing attention on debris phenomenon, is putting the issue under discussion by doctrine. As a consequence, the matter of definition of Space debris represents a significant challenge, not yet solved by existing framework of space law. Actually the five Space Law treaties don't give any clear element which could help lawyers to identify what constitutes "space debris".

**The lack of a shared juridical definition puts the space debris in a status of juridical vacuum, which fosters an environment of legal uncertainty around the matter.** The solution and clarification of such point is preparatory to the operations of mitigation and removal; any delay could induce a consequential delay in setting up actions to implement such space debris mitigation measures and operational systems.

**Strictly connected to removal operations are responsibility and liability for mitigation measures and for property rights<sup>[3]</sup>.**

According to majority of Space Law doctrine, “space debris” would fall within the definition of “space object” as a single huge mass (as ENVISAT or ROSAT space observatory) or as a part of it which has separated from the original spacecraft. Furthermore, if considered in a broad approach, the expression “component parts” could also embrace the space debris concept.

The “space object” needs of precise juridical parameters and not a general description where a debris is a space object which “no longer performs its original function” or has lost any tangible function. Space Law doctrine is basically agree on the principle that every space object which has lost its function and its utility, automatically becomes a space debris or in other words, a dangerous threat for the other Countries which hold space assets. It is important to create relation between the identify space debris and the Country that is the owner because in relation to the responsibility.

## 2 RESPONSIBILITY AND JURISDICTION:

## THE OWNERSHIP DOCTRINE

One of the most relevant unsolved issues, concerning space debris, is the setting up of a framework for a clear identification of responsibility on such space objects without control. The Outer Space Treaty (1967) with Article VI, provides that states are internationally responsible for national activities in outer space, including those of non-governmental entities and international organizations. **The matter of responsibility is not limited to the definition of jurisdiction or liability issues, which are related to space debris, but implies several reflections on the potential mitigation and removal operations set up by Countries.**

The main issue is that both these activities, as **every institutional and private activity in outer space, requires authorization** (e.g. through a licensing procedure) **and continuous supervision by the “appropriate” State** (the Launching State)<sup>[4]</sup>.

In order to understand the responsibility issue and find a solution for the space debris jurisdiction in the existing legal framework, a link between the Launching State and the piece of debris must be created. The above-mentioned link can be identified through another of the five Space Law treaties, the Registration Convention (1975).

Already the Outer Space Treaty at Article VIII provided that every object launched into outer space has to be marked on a national registry, which prove the responsibility of a specific Country on that object. Specifically, the Article talks about “jurisdiction and control”, to establish a juridical link between the State responsibility and the space object.

Relying on these legal basis, the problem raised by space debris is that they are objects without a function and, above all, without control by the State which had control on the spacecraft. The question is so focused on the potential application of the registry provision (Art. VIII) to these uncontrolled objects<sup>[5]</sup>.

**The Registration Convention was drafted to strengthen with a binding set of rules, the practice of registering objects at national level, providing an useful mechanism for the identification of State responsibility and establish in Space Law an ownership model for the objects<sup>[6]</sup>.**

The first key concept to be focused on is that ownership of objects launched into outer space and of their component parts, such as space debris, is linked to responsibility issue. Indeed, as a component part of a space object, space debris “owner” has to be identified through the property of the related space object from which the debris has been generated. The link, established by the registration procedure, is not only limited to the object but also to the future debris that

such object is going to produce, even if they would represent a huge mass (like ENVISAT).

These observations lead to the second key concept: the State of Register hold the jurisdiction on its object even after the end of its operational life, when it becomes a space debris. So also space debris, as space objects, are identifiable by checking the national register of the appropriate State, considered as the presumed owner of the debris component.

The issue of ownership of space debris has a strong influence on the setting up of future mitigation and removal measures by Countries in order to support the idea of a sustainable outer space. These kind of operations introduce a very important element to consider the space debris ownership: the “property” one. **Property implies the recognition of a potential value to the space debris, not for an economic reason but for its dangerous nature.** As the space debris belong to the owner of the original spacecraft which generated them, the dangerousity issue will be a concern of the Register State, even if the spacecraft was operated by a private entity.

### 3 LICENSING MEASURES FOR DEBRIS REMOVAL

A solution proposed to strengthen the shrewdness on debris creation is to expand the licensing procedures, already applied by several States, for all those space activities which could create debris.

In this context, the license is an act taken at domestic level, which state a set of rules to prevent the creation of space debris, through a preventive assessment of risk and clear assumption of responsibility by public and private entities.

However, one has to consider that the licensing or registration acts represent a bureaucratic procedure, useful to identify the State responsibility in outer space. Indeed the obligation of monitoring and the associated jurisdiction, stated by OST Art. VI, are effective and applicable whether the object is registered or not.

**Considering that prevention is the first level to avoid debris proliferation, a potential license, taken at national level should include not only risk elements of damage but also dealing with the options of debris removal, or, in other words, the after-mission planning. This planning especially would include a set of provisions for private entities which operate re-orbiting or de-orbiting missions on defunct satellites or wandering space debris<sup>[7]</sup>.**

The first objective to be achieved is an effective spread of licensing practices at an international level, in order to guarantee the right consensus to these provisions and to protect Countries interests in outer space. **The**

**national space law could represent the best solution to start this process of consensus building and to encourage other space-faring nations to adopt domestic laws on space activities licenses, which could mitigate the debris issue.**

Nowadays ten States have drafted more or less effective measures, within their **national space legislations**, to regulate the authorisation on space activities: **United States, Canada, Norway, Sweden, the United Kingdom, France, the Russian Federation, South Africa, Australia and the Ukraine.**

Unfortunately, only few Countries, among the above-mentioned ones, have drafted domestic legal and regulatory regimes on ownership of space objects, to impose onerous restrictions on the transfer of jurisdiction and control over such objects to foreign countries or entities<sup>[8]</sup>.

Focusing on debris removal operations the main regulatory framework, which could be taken as a model for future licensing provisions, is the US regime of International Traffic in Arms Regulations (ITAR). Such framework is an example of how legal and regulatory restrictions can be effective for national space activities, conducted by public or private entities.

Actually, Active Debris Removal missions are not exclusively regulated at domestic level because OST Art. IX provides that “In the exploration and use of outer space States Parties shall be guided by the **principle of co-operation and mutual assistance** and shall conduct all their activities with due regard to the corresponding interests of all other States Parties to the Treaty” and with non-harmful interference on its space activities<sup>[9]</sup>. At first glance such provision could represent an international **legal basis for the realization of a “sustainable space”, where Countries cooperate to clean space junk, as a general duty and with a widespread consensus.**(e.g. SSA Support Programme for Europe)

Except for Art. IX, which generally states a cooperation duty in space activities, no other provisions exist to define how an Active Debris Removal mission should operate within a legal framework. Only the principle of non-harmful interference could be interpreted as a way to avoid that any State can freely carry out removal operations in outer space on any satellite.

Indeed every debris, as a part of a space object has a reference “owner” (as stated by OST Art. VI), identified as the Launching State (under the Registration Convention) and only that owner is authorized under the space law to exert its jurisdiction on such debris.

Differently, the Rescue Agreement (1968) regulates the

assistance-related obligations of the Parties to the Treaty, concerning a safe and expeditious return home of the space object/astronauts on board where Art. V provide that “Each Contracting Party having jurisdiction over the territory on which a space object or its component parts has been discovered shall, upon the request of the launching authority and with assistance from that authority if requested, take such steps as it finds practicable to recover the object or component parts”. Since **the Rescue Agreement regulates the operations related to the objects already fallen on Earth, it can’t be applied to space debris which roam in outer space.**

In terms of legal status (*res communis omnium*), the outer space, even if very similar to the high seas, has several differences which must be considered, in order to think about a new international framework for debris removal. Provided that outer space is the “province of all mankind” (OST Art. I), salvage operations are not allowed for space objects or space debris, unless they are not provided by the owners of such objects.

This means that even though a satellite may not be functioning, this does not mean that it has been abandoned, and without consent from the nation that launched and operates the satellite, it cannot be removed, disposed of or otherwise interfered with.

The first conclusion related to ownership is that **no state has the legal authority to remove a debris object from space without the express consent of the object’s state of registry.**

Observing the issue at a national level, the United States can represent again a good example. The process of obtaining the consent to remove US space debris would involve formal diplomacy and the U.S. State Department. Considering a bilateral or multilateral agreement to lay the foundations for a **“debris retrieval policy” would require a technical exchange of data and information about an object’s design that could involve national security, foreign policy, the International Traffic in Arms Regulations (ITAR), contractual rights, intellectual property rights, and other interests**<sup>[10]</sup>.

At last, considering the national interests on space activities, the United States or other space-faring nations unlikely would give their consent to **retrieve objects** on their own registries, without a **formal diplomatic consultation.**

According to this model, any Active Debris Removal mission or On Orbit Service activity that involves a US satellite, or a satellite of another country that has US components or US technology on board, would likely fall within the definition of “export” under the US ITARs regulatory regime. Following ITAR mechanism, the information and material pertaining to

defense and military related technologies (for items listed on the U.S. Munitions List) may only be shared with U.S. Persons unless authorization from the Department of State is received or a special exemption is used. One has to consider that **a deorbiting mission needs to be compliant to US export provisions, especially because security interests are involved in space activities.**

Licensing agreements between the owners and former operators of the derelict satellites would solve the problem of “what can be removed” in outer space, as they would protect the rights and the national interests of the owners. Where a derelict satellite or a little space debris, registered to the United States, is slated for removal by a foreign government, especially if exporting of spacecraft-related technical data outside the United States, talks on agreements are compulsory, especially for issues that could arise from ITAR; in such context licenses or other waivers could be the solutions to address all these aspects.

Another relevant example of licensing debris removal operations, can be given by **Canada's Remote Sensing Space Systems Act (2005)**, which prescribes mandatory systems disposal requirements for all licenses. Under the Act, a licensee is required to ensure that his satellite system is disposed of in accordance with a system disposal plan approved by the Minister.

**Following Canadian model, national licensing rules could be amended to include an assured removal clause that would apply to satellites and relevant launcher upper stage(s)**<sup>[11]</sup>. Under such a clause, the licensee/operator could be required to take out an insurance policy to cover the costs of removal or disposal in the event that a failure or malfunction prevents performance of the planned disposal procedures at end of life.

#### **4 LIABILITY AS AN INCENTIVE TO SPACE DEBRIS REMEDIATION**

In the Space Law context, Liability is a clear concept which is strictly linked to responsibility but, at the same time, is rather different from the latter.

There are two existing provisions which deal with liability in outer space: OST Art. VII and the more specific Liability Convention. In a broad approach, valid for every space object, OST Art. VII provide that every State Party 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 space or in outer space, including the Moon and other celestial bodies.

The **Liability Convention (1972)** can be interpreted as an extension of this general provision and address in a more detailed framework the liability issues in outer

space. The Convention provide for two different liability regimes, which try to cover the main circumstances that could involve the State Parties: they are subjected to the double liability mechanism identified with absolute and fault liability.

Indeed, Art II and III of the Liability Convention envision two possible scenarios:

- a first circumstance, when a space object causes a damage on the surface of the earth to people or properties or to an aircraft flight;
- a second one when the damage is 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<sup>[12]</sup>.

As already explained in the first part concerning juridical definition of space debris, **the Liability Convention gives only a general and incomplete description of what constitutes a “space object” and its “component parts”**. While the lawyers could apply the Convention and OST Art. VII without significant problems to “standard” space objects, like operational satellites, space ships or the ISS, the application of such provisions to space debris create several complications.

The main issues to be addressed are:

- **clear juridical definition**, as already introduced in previous paragraphs
- **different kinds of liability** and
- analysis on the **location of the damage**.

As saw in the first part of this paper, the definition of what constitutes “space debris” is fundamental to grant the effective application of the OST Art. VII and the Liability Convention. Indeed, the practical reason of **attributing a given damage to a certain space object is essential to identify the correct liable State**; such process of attribution and identification clearly becomes rather unattainable in case of little pieces of space debris.

##### **4.1 Two different regimes of liability**

State Parties to the Liability Convention are subjected to the double liability mechanism identified with absolute and fault liability.

In the first scenario the Convention provide for an **“absolute liability”** or, in other words, a liability which has to be considered as objective, **erga omnes**, not avoidable by the liable State; **such State is obliged to pay a compensation to the victim**, according to Articles VIII-XII<sup>[13]</sup>.

The only exception which could possibly relieve the State to pay or could mitigate its liability is provided

by Art. VI, which establish an **exoneration from absolute liability if its proved 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”**. Another main cause of exemption is the so called **“contributory negligence”**, where it shall be proved that the same victim State contributed to the damage.

Actually, when lawyers foresee potential damages caused by space debris, is quite difficult to imagine that a piece of debris would originate a collision with aircrafts in flight within the air space of a Country or, much less probable, would fall on earth and destroy properties or injure persons. If a space debris fell on earth, with high probability, it would immediately burn in direct contact with the atmosphere; such process could be more difficult if the “space debris” is not a simple piece of junk but a huge satellite, like ENVISAT. So, the chance to apply an absolute regime to space debris collisions can be considered very low and no accidents of this kind have occurred to this day.

The second scenario foreseen by the Liability Convention, is much more ordinary than the first: **every collision which can occur in outer space between space objects or between a piece of space debris and a satellite** represent in effect **the main concerning of space lawyers** and space faring nations which hold space assets<sup>[14]</sup>.

The Liability Convention regulates the liability of the outer space scenario with a different and less harsh regime, if compared to the first one.

The **“fault liability”** would be the applicable regime for accidents occurring in outer space between space objects and space debris. Unfortunately, one has to consider that damages caused in outer space to space assets or astronauts, **would mainly involve an economic loss for the victim State more than the loss of life for its citizens or other intangible assets**; considered these conditions, the appliance Liability Convention is far less efficient in outer space than on earth.

Indeed, the fault liability has two main characteristics which differentiate it from the absolute liability: firstly, it is no more global (erga omnes) but based on fault recognition of the Launching State/s; secondly, it is no more joint and several, **only the State at fault may be sued**. The main outcome which prove the low efficiency of this regime, is that if somebody else and not a Launching State had the fault, no liability is provided for under the Convention.

Liability Convention Art IV (b) extends the range of potential circumstances of application to the concept of “joint liability”: indeed if the damage has been caused

to a space object of the third State or to persons or property on board that space object elsewhere than on the surface of the earth, their liability to the third State shall be based on the fault of either of the first two States or on the fault of persons for whom either is responsible. So, whenever two or more States jointly launch a space object, they shall be jointly and severally liable for any damage caused<sup>[15]</sup>.

#### 4.2 Actors and circumstances of damage

As previously said, the ratio which is behind the less strict mechanism of fault liability (in comparison with absolute liability) relies on the different kind of activities which can provoke a damage: damages on Earth by a space object could be particularly serious, also in terms of human life and need a particular legal response; otherwise, damages caused to space objects can be more frequent but they can lead only to an economic loss.

**One of the main issues concerning space debris accidents, relies on the connection between where the damage occurs (location) and when the State is going to be recognized as liable at an international level.**

First of all, the main question to be solved in order to apply the Liability Convention is linked to the definition of the Liable State, which under the Art. II and III, is identified as the “Launching State”. According to the Convention such term indicates the “State which launches or procures the launching of a space object” or “from whose territory or facility a space object is launched”.

Usually, when an accident in outer space involves satellites, the ISS or other space objects, the identification of the Launching State is not considered hard, because the size of such objects make the link with its owner quite easy and practicable. Differently, space debris raise again a series of doubts to space lawyers: indeed, as explained for the ownership issue, **the main difficulty to activate the liability mechanism relies on determining which Launching State will be considered as liable for space debris collisions**, because these pieces of junk are not always known by their own Countries. So the identification process could be particularly hard for damage caused by little space debris, mainly because of their small size which make difficult to go back to the actual owner of such component part.

Registration Convention Art. VI, gives its support in this sense to the identification process, stating that the States having capabilities must help the “victim State” to identify the space object which has caused the damage, under an international cooperation approach. Generally speaking, this cooperation duty reflects the principles of OST Art. IX, which provides that: “in the

exploration and use of outer space States Parties shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities with due regard to the corresponding interests of all other States Parties to the Treaty”. Moreover, in conducting their activities of exploration and use of the outer space they will avoid the “harmful contamination” of its environment. If interpreted as a general duty of making the outer space pollution illegal, in order to grant a sustainable space environment, space debris can be seen as part of this pollution. According to major doctrine opinion, **it is hard to recognize, under the international space law, that space debris are per se illegal, because every object in outer space is going to become a space debris at the end of its operational life.** The illegal behavior and the respective fault is linked to the action of producing space debris, with a thoughtless attitude to space activities; in effect the main concern of the international community, which focus the attention on this new issue, is the creation of too many space debris in an overcrowded environment.

There are several main circumstances which have to be taken into account when Countries decide to clean up this hard environment to grant a sustainable space and both can occur when such Countries deploy an Active Debris Removal mission. Even if developed with good purposes of cleaning, **States and private entities which operate an ADR mission must take into consideration risks of further collision that the clean-spacecrafts could generate in outer space and the connected risks of increasing the debris cloud with consequent liability.** For example, if a space debris collide with a spacecraft, fueled with Nuclear Power Source, the risk of damage would be huge not only for the outer space but also for the earth, if such NPS overtook the atmosphere. This is a typical situation which would involve not only the owner of the space debris, but also put at risk other launching States, even the State which in good-faith, is trying to remove such debris<sup>[16]</sup>.

**Risky maneuvers in managing space debris with robotic arms, harpoons, nets, grips or other technological means could accidentally deflect the space debris trajectory, causing inconceivable damages, if such a piece of junk destroy a NPS or other kind of fuel depots on spacecrafts.**

In this circumstance off chance, the Liability Convention Art. VI would find full application, as the States, directly or indirectly, involved in an accident (except for contingent victims), are considered jointly and severally liable and the victim may ask to any of these States the compensation of damage. It shall be responsibility of liable States to prove the respective amount of fault and the potential sharing of the burden of compensation.

### 4.3 Possible solutions to grant a liability regime

As above-said, removal operations, even if necessary to clean up the space environment, can entail a percentage of further accidents, that could create additional space debris or damages to a functioning spacecraft or cause the loss of space objects still operative. **The Liability Convention provide a compensation mechanism for damages caused by space objects and it could be also extended with good output to space debris collisions.** Art VIII provide a legal power to act against the liable State and entitle the victim State/s which suffered damage “or whose natural or juridical persons suffer damage”, to claim a compensation by one year.

The Convention also regulate the means to pursue the claim for damage by the victim, providing both solution by diplomatic channel and institution of a Claim Commission with binding power of decision, in case of unsuccessful negotiations.

The ratio of this compensation is called “restitutio in integrum” because the liable State that inflicted the damage should restore the victim State as much as possible to their position before the damage is occurred.

Except for these binding means, there is not an effective method or an international authority which can guarantee the compensation mechanism, especially for space debris accidents. There is an actual need for a specific and binding set of rules for recognition of liability on space debris and relative compensation, as deterrent measure to support mitigation actions and avoid creation of new debris.

**The first conclusion on liability issues relies on the fact that all the provisions which can be applied to damages caused by space debris, remain very weak without an authority that can make them effective (as deterrent effect).**

As the space debris represent a concrete danger to space assets and the inherent risk to the country sponsoring space debris remediation would endanger the development of ADR missions, alternative ways to face liability issues must be traced. Nowadays the “third-party liability” represents the main source of interest to space lawyers who try to integrate and provide a complete and all-embracing framework to cover the victims of potential incidents caused by space debris.

**The drafting of specific insurances for countries or private entities which hold space assets or operate ADR missions is still an unlikely practicable way.** An amount of insurance coverage, which took into account an objective “maximum probable loss” with real and reliable standards of risk is not yet feasible, for

several reasons.

First of all there are only three countries which mostly contribute to increase the space debris population, cause to their major number of available space assets: China (with 43%), United States (27.5%) and Russian Federation (25.5%). Only Space faring nations with large economic availability could sustain the expenses and the burden of insurances on space objects and it is not so obvious that they would do it voluntarily<sup>[17]</sup>.

**Secondly, the insurance from space debris damages would only protect the direct victim of such damages and eventually cover the costs of the space asset lost by the liable State; it would be unlikely extended to third-party liability.**

As a last but relevant point, one has to consider that nowadays the number of accidents involving space debris are still too low to attract the insurers interests to invest on this area; space debris represent a serious problem but still not so serious to boost a real business. Much less probable is the subscription of a generally accepted contribution, to be allocated for an international compensation fund to cover potential victims of space debris accidents; it could represent a good incentive to mitigate debris creation but actually Countries would unlikely accept such a solution.

An interesting proposal, which could have future developments, was done in 2009 by the NY based Space Frontier Foundation: the creation of an international fund to pay debris removal missions. **The “Orbital Debris Removal and Recycling Fund” (ODRRF) takes into account the financial aspects of debris removal trying to stimulate the private sector and create an international system to economically support the investments on ADR missions.**

The explanation of this proposal relies on the fact that private entities, research centers and universities hold the most advanced studies and patents on removal technologies, which could be the main component of success of an ADR mission. **The incentives granted by the ODRRF, financially sustained by States and private operators, would create a special insurance with low costs for commercial operators who want to invest on this business.** An interesting business, if consider that UNOOSA had listed about 3000 uncontrollable space objects, with a total amount of 23.000 Kg and a relative market of €2.3 billion for their removal.

**The main problem of ODRRF is its incompatibility with the existing legal framework of Space Law.** Indeed UNCOPUOS treaties and in particular OST Art. VI, provide that **space operations, like ADR cannot be conducted by private entities without the authorization and continuous monitoring of Launching States, which are at last responsible and**

**potentially liable at an international level.**

Moreover, an international mechanism on ADR would clash with the above-mentioned national practice on debris ownership of US doctrine: **every Country should keep the ownership on its space objects and relative debris, so it has the exclusive duty to manage the cleaning operations on its own assets. The consequence is that, according to US position, cleaning operations must be financed and developed at national level and no debris can be removed without prior consent of the owner State.**

## 5 INTERNATIONAL INITIATIVES FOR MITIGATION

As the existence of a duty to remediate to the creation of space debris by States seems to be an evidence, in terms of international practices, actually it depends on the real voluntary action of such States. In terms of binding treaties or provisions, one could say that the “remediation duty” to support the idea of a sustainable space, still doesn’t exist and no other specific duty can be discovered addressing debris issue<sup>[18]</sup>.

Specific legal initiatives such as Inter-Agency Space Debris Coordination Committee (IADC) Guidelines for debris mitigation and UNCOPUOS Mitigation Guidelines, which address the space debris issue on a more specific perspective (more than the UNCOPUOS Treaties do), are not binding. This characteristic make them falling under the “soft-law” domain and they will not be really effective if not enhanced by binding provisions.

The other problem concerning IADC and UNCOPUOS Guidelines relies on the fact that their mitigation provisions are more technical than legal: this lead to a situation in which only Space faring nations, capable of developing removal systems, are interested to follow them, without the real contribution of the non-space Countries.

Despite these lack of specific law, international level still remains the most practicable and important environment to solve the problem of providing a legal framework to space debris, in order to set rules applicable to everybody and to make such rules to become customary law.

**The European Union International Code of Conduct, drafted in 2008 (and revised in 2010) seems to be a first step to create an international consciousness and awareness on the importance of solving debris legal aspects, in order to lead States or the United Nation to endorse a new specific binding act for this growing issue.**

It is well known that the Code calls on Member States to establish "policies and procedures to minimize the possibility of accidents ... or any form of harmful

interference with other States' right to the peaceful exploration and use of outer space." The provisions within the European act are not limited to measures for space debris control and mitigation, but try to **focus the attention on the "Security" and the "Sustainability" of the outer space**, in a broader approach if compared to UN initiatives; **it is based on three main principles which could be at the basis of future draft initiatives on space debris:**

- **freedom of access to space for peaceful purposes;**
- **preservation of the security and integrity of space objects in orbit;**
- **due consideration for the legitimate defense interests of states.**

The main problem making the code not really effective is that it is again a non-legally binding act, based on a voluntary agreement among states with no formal enforcement mechanisms. A simply set of rules outlining the responsibilities or proper practices for an individual, party or organization can't be considered a solution to the problem of mitigating space debris.

The other problem is linked to United States position towards the Code, as in February 2011, thirty-seven US Republicans noted that they were "deeply concerned" about it because inadequate Obama administration briefings led to the mistaken belief that it could constrain missile defenses or ASAT weapons. United States position shows a comprehensible concern for sensible assets, which could be included in these international provisions at the same level of civil and commercial assets. Anyway, on February 17th, 2012 Hilary Clinton formally endorsed the code on behalf of the US, and, in addition to US, Canada Australia, Japan, India accepted to subscribe the Code.

In **January 2013**, also the UN General Assembly in its **Resolution 67/113<sup>[19]</sup>**, came back on the needs of debris mitigation mechanism on national and international level, stressing on the concept that space debris is a concern of "all nations" and not only space faring ones. The Resolution **focuses the attention on two crucial points:**

- **integrating and completing the space debris catalogue, in order to have a clear map of the danger;**
- **then put to use strategies to minimize the impact of space debris on future space missions.**

Nowadays, in European context, the main source of concern is represented by ENVISAT, world's largest Earth-watching satellite for civilian use, and today the largest debris wandering in outer space. On May 2012, the European Space Agency declared the death of its

Earth-observing satellite, of about 8 tons weight, and as it ended its operational life it started its life as a huge "space debris" in LEO. There is an international precedent similar to ENVISAT: the ROSAT observatory in October 2011 (2.7 tons). Fortunately the joint German, UK, US EO satellite, with an uncontrolled re-entry to the atmosphere, fell into the Indian Ocean and disappeared without causing any damage to persons or properties on Earth. But if any damage had occurred, the three owners would have been jointly liable under the Liability Convention and obliged to cover the compensation to the potential victims.

ENVISAT is still wandering in outer space and nobody knows if and where is going to cause damages and, above all, which trajectory is going to follow. It mainly represents a source of concern for ESA Countries because of its uncontrolled orbit, which could cause a potential huge damage to other space objects.

Under the Space Law doctrine, ENVISAT can be considered under space debris issue; and the current legal regime for international Liability provide that ESA could be liable for ENVISAT (legally considered as a big space debris) potential damages. Under the Liability Convention Art. XXII, this practically lead to a mutual fault liability of all the ESA Member States, obliged to pay compensation to the victim of the potential collision.

## 6 CONCLUSIONS

It is fundamental to start with a deep analysis of the legal framework, in parallel to the removal technologies, in order to be ready to operate an ADR systems and create opportunities in the private sectors.

## 7 REFERENCES

1. Legal provisions of COM(2013)107 - *Space surveillance and tracking support programme*, February 28 2013, art. 2.
2. See M. LISTNER, *Legal issues surrounding space debris remediation*, The Space Review, August 6 2012 and YAW OTU MANKATA NYAMPONG, *Legal and regulatory challenges to ADR and OOS Activities*, European Conference on On-Orbit Satellite Servicing and Active Debris Removal: Exploring Commercial, Legal, and Policy Implications Brussels, 30 October 2012
3. See A. KERREST, *Space debris, remarks on current legal issues*, Institut de Droit des Espace internationaux et des Télécommunications, Université de Bretagne Occidentale, 2001.
4. *Treaty on Principles Governing the Activities of*



- States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty)*, London, Moscow, Washington, adopted 19 December 1966, opened for signature 27 January 1967, entered into force 10 October 1967, Art VI.
5. See F. VON DER DUNK, *Space debris and the Law*, University of Nebraska - Lincoln, 3 January 2001.
  6. See *Convention on Registration of Objects Launched into Outer Space (Registration Convention)*, New York, adopted 12 November 1974, opened for signature 14 January 1975, entered into force 15 September 1976.
  7. See A. KERREST, *Space debris, remarks on current legal issues*, pp. 3-4.
  8. See F. VON DER DUNK, *Space debris and the Law*.
  9. *Outer Space Treaty* (1967), Art IX.
  10. R. ZIMMERMAN, *Don't you dare touch my space junk!*, in *Behind the Black*, 1 September 2011.
  11. *Remote Sensing Space Systems Regulations (SOR/2007-66)*, Canadian Justice Law Website.
  12. *Convention on International Liability for Damage Caused by Space Objects (Liability Convention)*, London/Moscow/Washington, adopted 29 November 1971, opened for signature 29 March 1972, entered into force 1 September 1972, Art. II-III.
  13. *Liability Convention*, Art. VIII-XII.
  14. Considered that NASA estimates that “our planet’s orbital debris cloud contains more than 500,000 pieces larger than a marble and more than 20,000 at least as big as a softball” (Space Surveillance Network data), it is easy to imagine that space debris collisions will represent a growing problem for the future, as much as countries will launch new satellites. One of the most evident and latest examples of how space debris could be dangerous for operational space assets, date at 2009, when the satellite Iridium 33 collided with an inactive Russian Cosmos satellite, contributing to increase the space debris orbital population. See M. WALL, *Space junk is now a public problem*, in MNN, 13 January 2012.
  15. *Liability Convention*, Art. IV.
  16. See A. KERREST, *Space debris, remarks on current legal issues*.
  17. C. LEHNERT, *Space Debris Removal for a Sustainable Space Environment*, ESPI Perspectives 52, September 2011, p. 1.
  18. See M. LISTNER, *Legal issues surrounding space debris remediation*, 6 August 2012.
  19. A/RES/67/113, *Resolution adopted by the General Assembly on International cooperation in the peaceful uses of outer space*, pp. 2-3. And A/AC.105/C.1/2013/CRP.19, *National research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris*, 8 February 2013, pp. 2-3.