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# SPACE STATION AND SPACE DEBRIS

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Abstract

Space Stations, as main human space constructions, will produce – during construction, use and eventual destruction or reentry to atmosphere – a big amount of debris, or be collide by them.
Separately of types, something must be done, because the flux of man-made debris is continuously increasing.
Ingenious technical methods, have been suggested, for the removal of those unusable and dangerous objects and different types of shielding for protection.
From the legislative field, an international specific agreement, as the ILA project, is the only real solution.
Until the mechanical methods become operative, or we have the special rules approved for such important restraint for space activities, we must use the texts we have, for the preservation of space environmental for real mankind benefit.
General rules as the OST, must be the first and principal tool for such object, followed by others on the same and following texts.
We must not fall on Byzantine discussion, we must applied existing rules.

## INTRODUCTION

As it was well recall by Lorenz [1] at the beginning of space exploration, it was believed that the big threat for space vehicles and their crews would be the possible struck with meteorites.
It was proved that the flux of such natural objects, was much lower than expected.
But as the same – besides certain storms – is relatively constant, the flux of man – made debris is continuously increasing, as it was clearly pointed by the chairman of this Sessions [2].
Sooner, with more man activities, an impact with artificial man made objects, their parts or components had grown up; it's a dangerous but real possibility.
The author clearly says in 1989:
"As large space stations are to fly in the next decade with orbital lifetime of twenty years or more, the probability of debris impact becomes significant"
From those years, began the mayor concern of space agencies, with such problem [3].
At present man created debris, are estimated in 4.500 tons orbiting Earth,
and some proposed solutions to the problem resemble science-fiction scenarios [4].
At the first Colloquium of the Institute, Andrew G. Haley recommended:
"No objects should be placed into orbit space which cannot be guided back to Earth or destroyed by some others means, such as being guided into the sun" [5].
Although some countries have taken certain measures [6], from some time, the problem have not been solved with technical or juridical solutions.


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## THE STATION

The first known account of space station concept was a fiction, published by Edward Everette Hale.
In 1857 the Atlantic Monthly published his "The Brick Moon". He describes an artificial moon, constructed of clay bricks, that travels by means of a colossal flywheel [7].
The future will need 50 trips to place in orbit the components and 30 more for the fuel, food and other supplies during construction.
Sixty mayor pieces, must be assembled outside, without a previous test on Earth, during 1705 hours of spacewalks.
A real mammoth puzzle, at 250 miles above the planet, to be completed in 2004.
Sixteen nations will be directly involucrated in the project.
The station will give an unique place, not only for scientific research, manufacturing of new substances and articles, but also for art.
From his position artists, will have a new dimension of universe and Earth, that would motivate newer forms of art [8].
All this work, will produce, during assembly and use of the station a big amount of debris.
For the construction period, states involved, must take due care for such situation, not only in account of their direct interest - a proper debris can hit the station - , but also because of others interests.
Debris will be a problem from the beginning and during the life time of the station. His end is already planned.
When the station's life has ended, automated transfer vehicles (ATV) will force the entire station down, and it is planned that 90% will be cinder by the time it reaches Earth's atmosphere and finally the Pacific Ocean for the remainder.

## TECHNICAL SOLUTIONS

As it always happens, the first approach to solve the problem, come from the technicians.
One of the first proposed solutions, was to de-orbited them. This can be done, attaching a retro-motor, or by a space shuttle or special machines.
An other possibility is to utilize them in orbit. This idea sounds cheaper than others; but rather complicated and limited.
Some debris, can be "cannibalized", as is done with cars and aeroplanes.
Not very much debris can be useful for those purposes, because techniques advanced so quick, that a lot of instruments and parts became rapidly useless.
Much interest could be the use of some parts, as shielding for new vehicles, once in orbit.
It have been suggested also, that adequate shielding, will give a some protection [9].
At present such ideas, seems to bring controversy among partners in the station[10].
A lot of vehicles capable of recollection debris have been suggested
Kaplan described in 1982 [11], TRHASH-1, Thrash Remover and Satellite Hauler and Lorenz proposed a "Debris Collection Vehicle".
At the 1995 Coll. Sterns and Tennen, comment the "ASPOD" and their legal implicances [12].

## INTERNATIONAL AGREEMENT

Such instrument will be the only real final solution to the problem.
In such way, the "ILA Buenos Aires International Instrument on the Protection

of the Environmental for Damage Caused by Space Debris" is the main and best effort.
As it is reminded by it's Reporter Prof. Williams [13] "...it was soon realized that the main objective (of the project) was to gain the maximum support from the international community and, therefore, start at a low level of compulsion".
The project has all the elements for a future, step by step consensus.
There are many still conflictive points; as the methods of dispute but it's represents the more advance ideas on such future text.
In meanwhile, as suggested by Catalano Sgrosso [14] an unanimously resolution approved by the General Assembly of the United Nations, - as in other matters - , could fill the actual gap.

## PROPOSED ACTUAL SOLUTION

Until the moment, in which states adopt a Convention on Debris – maybe the ILA Project - , we must find a solution.
It seems that the Liability Convention, because of a lot of interpretation difficulties, will not be applied.
We have to surpass such problem.
If the specific rule cannot be used, we must find solutions in the general ones.
As it was already pointed, debris have two characteristics:

1) They are useless things;
2) They restraint the use of a portion of space, regardless it's size.

As garbage, they do not follow art.1 OST.
Does garbage produce a "benefit" for mankind? No.
Is garbage of the "interest of all countries"? No.
Outer space is open to "use" by all countries. This type of "use", is the one that produce an utility, or in the words of the Treaty, "...a benefit...".
Debris do not fall into this category.
Does "garbage" contribute to co-operation and mutual assistance (art. IX)? No.
But what seems more important, is that a debris, regardless it's size, is occupying a portion of space without any useful purpose and as a form of national appropriation, against art.II.
With these considerations in mind, we can think of an unanimously approved UN Resolution, by which states that leave debris in outer space – of any kind – are acting against the OST.
Because such kind of objects, does not produce any benefit and there are not of the interest of all countries.
On the contrary, they posed a real threat, to activities in outer space.
But what it is more dangerous from a juridical point of view, is that debris may constitute a form of national appropriation of portions of outer space.
Obtain this qualification from the UN, would be very difficult, so we must go step by step, until the final solution.

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## NOTES

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6) As in the case of the Delta 180 SDI test, that was planned in such a way

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