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Space Traffic Management: Comparative Institutional Aspects

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"Tout en étant parfaitement au courant des faits de l'histoire, il doit s'appliquer à étudier les prolongements futurs de l'évolution actuelle et le faire avec une probité résolue, temperée par une appréciation exacte des problèmes pratiques que posent les réalités de la vie." Manfred Lachs (1)

1. Introduction

To know exactly where each spacecraft is, in the air or in the outer space, where it comes from and where it is going to, what it is doing and how it is working in a given moment. Aiming to assure safety of space activities by preventing collisions and harmful interference, as well to protect the outer space and Earth environment. (2)

This is briefly what we are dealing with when the point is space traffic management

To have all these data in a real time we need by no means:

- A new kind of international co-operation as deep and confident as we do not have yet;
- A complex and competent international system (network) with highly qualified international teams and last generation hardware to fulfil all involved tasks;
- A global space traffic management institutionally established.

Without a permanent, efficient and self-sufficient institutional framework, a true global space traffic management seems to be impracticable.

Human being has been able to create very sophisticated systems of maritime, railway, railroad, and air traffic management. However, until now, in 44 years of Space Age, he was unable to work out a space traffic management system.

Is it really needed? Yes, it is, today more than yesterday and even more tomorrow than today.

"How much space traffic is necessary before you institute some space traffic control?" - William O. Glascoe III asked in 1999. He answered that "traffic arises from a lot of vehicles vying for the same space at the same time whether or not they are destined for the same place."

In fact, the geostationary orbit already faces a traffic jam in many passages. Conflicts caused by crowding of space vehicles can reach critical mass. At the same time, the question of space debris is becoming challenging. As yet there is no international solution - neither in perspective - for the problem of increasing amount of space debris the heavy used orbits are going to be more and more polluted.

Hence the reasonable Glascoe recommendation: "We need a Space Traffic Control System under development now than later." (3) It is a prudent and wise approach. It makes possible to anticipate knowledge and solutions for future inevitable problems, as well as to prepare expertise, to create hardware for such a crucial task and to gather experience in the field.

The foundation of the Space Traffic Management System could be laid down at the same time with the construction of the Global Air Traffic Management System, thought the later is far more urgent, of course. Operationally, the two systems are very different, but technically, politically and legally all works relating to the Global Air Traffic System will be quite beneficial for the Space Traffic System.

There seem to have no insurmountable technical obstacles to start shaping a Space Traffic Management System. The main barriers for this program are undoubtedly economic and political.

"It would be necessary to put some order in this" ("Il faudrait y metre un peu d'ordre"), Roger-Maurice Bonnet, Scientific Director of the French Space Agency (Cnes), said, speaking specifically about the European Earth Observation Strategy. (4) Yet this commentary is as well as suitable to the question of space traffic today. It is evident that here also there is no appropriated international order.

Demands for a global Space Traffic Management are already wide and multiples. A symptomatic indication is the proposal recently presented by José Achance, Earth Observation Director of the European Space Agency (ESA). According to him, "the demographic, industrial and economic development of mankind demand that we organize in planetary scale an integrated administration of the

terrestrial and maritime environment, as well as of the natural resources". It would be a Global Monitoring for Environment and Security (GMES). In José Achance view, this administration passes necessarily thought the understanding and the surveillance of the nature' complex processes, to which the space tools are absolutely indispensable. (5)

It is obvious that such a planetary integrated administration will be much more secure and efficient if it could count on a global space traffic management that could contribute to assure safe and orderly functioning of all space tools linked to the system.

An huge difficult for working out of an entire space traffic management system would surely be the deployment of weapons in outer space and consequently its transformation into battlefield. (6) The new, space armed race it would engender, as well as the clear predominance of military doctrines defending a national control of and superiority in outer space will undermine the cooperative and trustful foundation indispensable for the space traffic management.

2. Institutional aspects

As Glascoe pointed out, "the existing body of International Space Law does not consider an authority controlling 'space traffic' anywhere in its text. This void must be filled before progressing." Once again it is the sound preventing approach.

What kind of institutional structure could be better to develop and to set up a space traffic management in the foreseeable future?

It is not easy to answer this question today. However, we already have some practical and historic references to think about it and to envisage some ways to arrive there.

The International Telecommunication Union (ITU), to certain extend, manages the traffic of geostationary satellites, practically since the beginning of the use of this relevant orbit in the sixties. Under the ITU supervision the satellite operators coordinate their demanded orbital positions and radio frequencies. The ITU also controls the assignments of communication radio frequencies in space and of service areas on the ground.

Although the ITU work is extremely important, it is limited to the telecommunications programs and not to all aspects of them. In fact, it doesn't encompass many tasks required for a space traffic

management: satellite collision preventing service, re-orbiting and re-entering regime for non-functional space objects and general outer space debris regime (7), among others. It means:

1) We have no a international system, based in a complete and precise directory with information about all objects launched into outer space, capable to track them and to alert their close encounters, as well as to provide them the optimal guidance option;

2) We have the 1993 ITU recommendation to re-orbit geo-stationary satellites, but it is not yet a legal obligation. Far beyond this we need to conceive an international regime for operations of re-orbiting or re-entering into the atmosphere of any kind of spacecraft.

3) It is also necessary to conceive an international regime for all issues rosed by space debris, starting from its legal definition, as well as the removal of space debris and the minimization of the arising of new ones. Of course, it includes the development of industrial standards and their implementation by all States and private enterprises.

"Who is going to coordinate all this activities in a place that doesn't fall under any nation's jurisdiction or doesn't have an internationally recognized boundary?" - Glascoe asks.

Some of these tasks have being accomplished, at least partially, by States individually. For instance the US Space Command for many decades tracks debris objects larger than 10cm in low orbits and larger ones at higher orbits - 1m at geostationary orbit.

The deeply unequal current world geopolitical situation strongly favors national unilateral solutions, as they seem better to safeguard the national economic and strategic interests of the most powerful countries.

That is why the first institutional question we need to answer is whether a national structure of one or some great powers is sufficient and legitimate to meet with all space traffic management requirements.

A restricted national solution to this essential issue hardly will be acceptable by the international community as a whole, unless another embracing and cooperative way will be absolutely impossible, which certainly is not the case. Emblematic in this sense is the recent

European Union decision to implement the Galileo satellite navigation system, rejecting the GPS worldwide monopoly position. (8)

To manager the space traffic it seems necessary, at last, three international bodies, working in close relationship:

1) Data Base body with real time information about the situation of all spacecrafts;

2) Regulation body in charge of the creation of operational rules, a kind of standards and recommended practices;

3) Permanent coordination body in charge of monitoring and evaluating the accomplishment and the efficiency of the adopted rules.

These bodies should be essentially technical and autonomous. They could be composed by and render account to the United Nations Committee for the Peaceful Uses of Outer Space (Copuos). They could be created gradually, trying to overcome step by step all kind of resistance existing today.

Above all, the most important action is to start such a process. The first step certainly must be a Copuos decision to produce in its Legal and Scientific and Technical Subcommittees a wide and deep discussion on the necessity and the possibility of the creation of a Space Traffic Management System. In this sense, it probably would be quite reasonable to establish a special working group to study this issue. In short, we should include this item in Copuos agenda. It would be wiser to do this now as we all are aware that it will have to be done one day in not so remote future.

3. Comparative Institutional Aspects

We already have accumulated different international institutional experiences, particularly in the United Nations system, which can be useful to develop our project. (9)

It seems that the most valuable of them is the institutional model established by the 1944 Chicago Convention, the Charter of the International Civil Aviation Organization (ICAO). (10)

As Dr. N. Jasentuliyana has stressed properly, "the regulatory structure of the [Chicago] Convention's Annexes, in particular, has brought international uniformity, to a great extent, to international civil aviation, and has led to the greater safety, regularity and efficiency of air transport". (11) Safety, regularity and efficiency also will be the permanent purposes of the Space Traffic Management.

Special significance for us has the ICAO structure and law-making process. This system is responsible for adopting and amending international standards and recommended practices and procedures. It has been working successfully all along more than half a century.

There are many reasons for the success of the ICAO system. One of them has being the ability to delimitate the matters falling under its competence and the matters belonging to the domestic jurisdiction of each State. It surely will be one of the most arduous issues to cope with in shaping the Space Traffic Management system.

This extremely hard point led us to the very sensitive political area. The ICAO has been succeeded in separating the technical and political aspects of international civil aviation, as Dr. N. Jasentuliyana pointed out. Yet this task will be much more challenging in space activities due to its incomparable huge strategic and political problems. Nevertheless, we will probably have no another choice than to leap over this wall if we really want to achieve a worldwide safe, regular and efficient Space Traffic Management.

It means that firstly we are "condemned" to construct a consensual political will strong enough to face such a complex and historical undertaking.

A timely motivation for doing this great effort are the recent warning words from the Finnish Professor Martti Koskenniemi: "Without the ability to articulate political visions and critiques, international law becomes pragmatism all the way down, an all-encompassing internalization, symbol, and reaffirmation of power". (12)

4. Conclusions

It is necessary to place the question on Space Traffic Management in the Copuos agenda as soon as possible.

To approve this almost impossible decision in our time, it is necessary to make a political miracle, which is as well as indispensable to solve many others even more pressing world problems.

Let's make a miracle.

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