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Security in space: Should space traffic management also concern payloads management?

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ABSTRACT

Significant initiatives on space traffic management have been recently taken, essentially by developing principles of outer space transparency and confidence building measures (TCBM) beneficial to a safer conduct of space activities. The need for improved practices in space traffic management is a consequence of the increasing number of space-faring nations allowing for more types of missions, growing number of space debris, new private entrants, and rising space content in running critical national infrastructures, to name a few. These expanding space activities underscore the society's dependency on space systems and its vulnerability, calling for an improved long-term sustainability of outer space activities. But the lack of information on the nature of some space payloads and their associated missions introduce a persistent flaw in succeeding to achieve a long thought stable and safer space environment. Indeed this noticeable weakness in the mentioned initiatives is not taken into account at this stage. To overcome this difficulty, a space situational awareness system (SSAS) based on a multinational organization, or under the purview of a UN steered agency, is proposed. It could be implemented promptly, provided there is a shared political will and a recognized urgent need to do so by major space-faring nations gauging their long-term interest while there is still time. The space deterrence postures by dominant space powers that have been identified during the past ten years, or so, argues in favour of broadening as soon as possible the scope of the current TCBM.

1. Introduction

The current regulations for outer space activities are governed by a set of treaties, agreements, declarations, principles and guidelines, the genitor of which, to make a long story short, is the well-known 1967 Outer Space Treaty.

Basically, this Treaty prohibits the placement and the use of weapons of mass destruction in outer space and on celestial bodies, stating that space belongs to humankind for the purpose of exercising peaceful uses. Successive regulations enumerate a series of dispositions, including national laws, and describe how to handle launchers and registration of space objects. Principles adopted by the UN General Assembly governing direct TV broadcast, remote sensing of the Earth and the use of nuclear power in space constitute a corpus of behaviours and practices when engaging in outer space activities.

The continuing development of these activities by an increasing number of space fairing-nations covering an ever widening range of applications, together with the progressive involvement of the private sector have pressed on the necessity to add a new set of behavioural rules in space in order to accommodate for such densification of activities. A significant portion of these commonly accepted rules and guidelines are dealing with space traffic management.

In the recent years, three initiatives have been undertaken toward a safer and more secure traffic management. The UN Governmental Group of Experts (GGE) on the transparency and confidence-building measures (TCBM) in outer space established in 2012 presented its report at the UN General Assembly in 2013. A working group of the UN-COPUOS on the Long-Term Sustainability of Outer Space Activities established in 2010 presented a first draft report at the annual COPUOS meeting in June 2014, and will remain open for receiving new material until the June 2015 meeting of this Committee. And thirdly, in 2008, the European Union initiative for a Code of Conduct for Outer Space Activities (CoC) has been enriched

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since with non-European contributions and is now open for comments and suggestions, and relabelled as an International Code of Conduct (ICoC).

The common thread of these different works is to propose the best possible practices for space traffic management as far as one can look into a foreseeable future for space activities. The general approach is globalist by nature, in line with the founding treaties advocating for a universal application, the rules of the road being the same for everyone. But it is difficult to rule out that for geopolitical reasons, a particular space actor might consider setting its own way, not really feeling that he is derogating to generally accepted guidelines and principles, thus gaining a palpable advantage. If quite a lot is offered about how a safer circulation of satellites could be organized, nothing is mentioned about the nature and missions of payloads carried by space vehicles which could also influence the degree of safety and security of traffic management. There are a number of reasons for that discretion, many of them being related to national interests. Moreover, recognizing the major steps that these three initiatives could bring for a safer place to conduct outer space activities and their usefulness to ensure stability in space, we contend that the credibility of sustainable space activities has to address at the same time information about the nature of the Earth orbiting payloads, restricting to this portion of the space environment as a start. Indeed, if one considers that space can be treated as a public domain, as for instance roads are, then the occupiers of such domain should know *a minima*, for their own safety, the nature of the objects they might encounter while travelling in space, and be aware of the dangerousness of this environment, if any.

2. Space traffic management: where are we today?

Before looking at the issue posed by the nature of the payloads circulating in space, it is worthwhile to take stock of the progress made in terms of traffic management regulations as a result of the above mentioned three initiatives recommendations as they are today.

2.1. The UN Governmental Group of Experts on transparency and confidence-building measures in outer space activities [1]

The Governmental Group of Experts was established by the UN Secretary General pursuant to a UN General Assembly resolution (65/68) in December 2010 and prepared its report between 2012 and 2013. The final report was endorsed by the UN General Assembly (resolution 68/50) in December 2013. The UN COPUOS in 2015 will identify those recommendations that could be adapted to enhance the safety of space operations and long-term space activities sustainability.

The GGE acknowledges that treaties on outer space activities contain certain TCBM of a mandatory nature and recognizes that non-legally binding measures for outer space activities should complement the existing legal framework relative to outer space activities. The conclusions and recommendations of the report include:

- Efforts to pursue political commitments in the form of unilateral declarations, bilateral commitments, a multilateral code of conduct to encourage responsible action in outer space activities;
- Review and implementation by States the proposed TCBM through relevant national mechanisms on a voluntary basis, to the greatest extent practicable and in a way consistent with States' national interests;
- Building confidence and trust among States through “universal participation in, implementation of and full adherence to the existing legal framework relating to outer space activities in which they are parties, or subscribe”;
- A recommendation that the UN General Assembly decides how to further advance TCBM and provide for their universal consideration and support “including by referring the above recommendations to the COPUOS, the Disarmament Commission and the Conference on Disarmament for consideration”. In addition, the Group recommends that the Member States take measures to implement as much as they can principles and guidelines endorsed on the basis of consensus by the COPUOS and the UN General Assembly.

Under the heading relative to enhancing the transparency of outer space activities, of particular relevance to the space traffic management, the following should be noticed concerning risk reduction notifications, including:

- Exchanges of information on forecast natural hazards in outer space;
- Notification of planned spacecraft launches. In particular States should provide pre-notification launch of space vehicles and the purpose of the mission of the launch vehicles [2];
- Notifications of flight manoeuvre that may pose a risk to the flight safety of other space objects. States should notify in a timely manner potentially affected States of scheduled manoeuvres;
- Notifications and monitoring of uncontrolled high-risk re-entry events. States should support the development and implementation of measures to exchange information with all States that may be affected by a re-entering space object or residual material from the re-entering space object that could cause significant damage or radioactive contamination;
- Notifications in case of emergency situations linked to natural and man-made threats to the flight safety of space objects. These include risks induced by malfunctioning of a space vehicle, loss of control that could result in an increased collision between space objects or a high-risk re-entry event;
- Notification of intentional orbital break-ups. When intentional break-ups are necessary, States should inform of their plans others that may be affected, including measures that will be taken to ensure that the intentional destruction will be conducted at sufficient low altitude to limit the orbital lifetime of resulting debris. Such actions should be carried out along the Space Debris Mitigation Guidelines of the United Nations as endorsed by the UN General Assembly in its resolution 62/217 [3].

2.2. Draft report of the working group on the long-term sustainability of outer space activities

At its session in February 2010, the COPUOS Science and Technology Subcommittee established the Working Group on the Long-Term sustainability of Outer Space Activities.

The objective of the Group is to identify areas of concern regarding long-term sustainability activities in space and propose measures that could enhance sustainable use of space. These would be non-binding based on a voluntary basis. In order to prepare its recommendations, four expert groups were set up for consideration of the following topics: i) sustainable space utilization supporting sustainable development on Earth, ii) space debris, space operations and tools to support collaborative space situational awareness, iii) space weather, and, iv) regulatory regimes and guidance for actors in the space arena.