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Long-term sustainability of outer space activities

**Further ideas on a set of goals for achieving the Vienna
Consensus on Space Security and the need for thorough
reflection on the modalities of addressing the complex issues
associated with space traffic management and the
justifiability of the high expectations of early decisions in this
area**

Working paper submitted by the Russian Federation¹

**The urgency of reinforcing the role and responsibilities of the Committee and its
subsidiary bodies with regard to normative regulation of space security and
exclusion of any manipulative practices aimed at actually prejudicing their
competencies**

1. At the fifty-third session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, in February 2016, the Russian Federation submitted a working paper entitled “Reviewing opportunities for achieving the Vienna Consensus on Space Security encompassing several regulatory domains” ([A/AC.105/L.304](#)), initially distributed as conference room paper [A/AC.105/C.1/2016/CRP.15](#). The working paper focuses on those potential decisions within the Committee that would be realizable and pertinent from the viewpoint of introducing elements of stability and predictability into the regulation of outer space activities. Specific methods of drastically improving the safety and security in outer space were proposed. The implementation of the initiative to establish a United Nations information platform designed to form and maintain a database of objects and events in near-Earth space that would be universally accessible, continually enlarged by accredited suppliers and operationally useful is expected to be the most important factor contributing to the success of that endeavour. Evidently a steady progression on

* [A/AC.105/C.1/L.355](#).

¹ The content of the present document was first made available as a conference room paper ([A/AC.105/2016/CRP.13](#)) at the fifty-ninth session of the Committee on the Peaceful Uses of Outer Space.



the basis of enlightened and reasonable interests is required. By virtue of its mandate and status, the Committee should stimulate the intellectual thought and play the role of motivator and navigator for States. This is a complex task as, due to subjective factors, the Committee itself is faced with a critical situation: the various scenarios drawn up by a number of States, as those scenarios combine, show that the Committee has already been bypassed and is very likely to be bypassed again when important issues relating to outer space activities are addressed. The situation around the draft code of conduct for outer space activities is an example that is relevant in this regard. This document was designed as a tool for reorganizing the regulation of the exploration and use of outer space. Of particular note in this context is the unilateral decision, adopted by the United States of America at the national level and quite controversial from the viewpoint of international law, to give its own companies carte blanche to exploit mineral resources in space, as well as deliberate effort to disperse the discussion of the mineral resources topic across numerous forums outside the Committee. The chain of further actions of this kind, which can prejudice universal regulation as it is generally accepted, is not yet absolutely transparent. It is still possible to sort out the situation, especially because some of the motives are quite evident. Political romanticism in relation to outer space and the international dialogue on the future of outer space activities is no longer in good graces. On the contrary, there is a disregard for the interests of the international community and for the Committee's functions and status. There is every indication that not all States need the Committee as a forum giving scope to political ideas and debates and as a generator of legal and normative regulation of activities in outer space. Therefore, the Committee is forced to tread the narrow path of continuously examining certain existing practices (in the field of legal and technical regulation), and nothing more than that. It should be recognized that this strategy has partly succeeded already. As a result, after several years of work on the topic of ensuring the long-term sustainability of outer space activities, no one would be able to recall which specific and noteworthy national practices have been discussed. Efforts aimed at making the work on the normative regulation of safety of space operations meaningful are opposed by certain delegations or encounter an unwillingness to analyse the problems and proposed solutions. Meanwhile, States should meticulously and objectively analyse and monitor the tendency towards an increased influence of private law regulation of space activities (both at the national and international levels), especially since such regulation can potentially affect highly sensitive aspects of space security. Active or even proactive involvement of business in the development of proposals for the regulation of space activities should, to a reasonable extent, be encouraged. Nevertheless, such an approach does not imply that whole segments of that regulation should be farmed out to private corporations, especially not the safety of space operations. When someone decides to regulate some aspect or other of space security on the basis of the norms of private law, that effectively means that national legislation will be applied due to the absence of well-shaped principles or norms of international private space law. Consequently, circumstances may contribute to article VI of the 1967 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), losing its fundamental institutional significance.

“Hurray for space traffic management!”

2. Recently, the topic of space traffic management has decisively been pushed to the fore and has become the object of full international attention. One can see the phenomenon of its most active promotion: a media hype is being created, various international forums boost enthusiasm for space traffic rules more and more often, and the impression is created that the establishment of space traffic rules is imminent. Something reminiscent of a political movement is raised in support of an accelerated

transition to practical solutions in this field. On the whole, the only possible explanation is that a comprehensive strategy is in place to wage a promotional campaign. This attempt to get a head start in the development of a space traffic management concept (first and foremost in relation to devising a space operations safety regime) must be carefully scrutinized by States and the independent expert community. It is necessary to act through logic and sound reasoning. Such an approach will allow to shift individual analysis of the topic to a more realistic starting level.

Regulation of the safety of space operations is to bring a stronger sense of competence in matters related to the development of, and empirical support for, a concept of space traffic management

3. Common sense suggests that the feasibility of a concept of space traffic management is closely interrelated with the regulation of space operations safety. A problem-investigative and decision-contemplative process vis-à-vis space traffic management will be hard to establish without an effective space operations safety regime. However, such a regime is what should be at the core of a realistic vision of a possibly more comprehensive approach to space traffic regulation. Meanwhile, a strategy for developing the regulation of space operations safety was drawn up as early as 2011, was approved by all and yet is not being implemented. Solutions proposed in the context of the elaboration of a set of guidelines for the long-term sustainability of outer space activities that would allow to make major improvements in mitigating hazards in space, decreasing the negative effects on the space environment and facilitating its clean-up, are not seen as positive by a number of States. For example, the United States reduces the entire issue of space operations safety mainly to one aspect: enshrining in the guidelines that States intend to cooperate with a view to predicting and avoiding possible collisions. The United States shows no interest in discussing in a decent and worthy manner and effectively resolving other quite apparent safety and security issues. The proposals by the Russian Federation are clearly and deliberately being blocked despite the fact that most of them are motivated by the same considerations as those that underlie the recommendations and the groundwork of experts and politicians (including those representing the United States), and are contained in the well-known publication *Cosmic Study on Space Traffic Management* by the International Academy of Astronautics. The United States has not yet given any plausible explanation of why it would be difficult for it to live with the proposed safety and security regulations. At the same time there is an increasing tendency to skip over the subject by diverting most of the attention away from it and professing a heightened commitment to space traffic management. Being unprepared even to improve the existing conditions for ensuring space operations safety based on a voluntary document, the United States, one way or another, now shows an enhanced interest in the development of rules for space traffic management and seeks to shape attitudes in this area. This strategy of swapping topics is worth noting.

Securing information needs

4. According to all serious assessments, potential rules for space traffic management will have to be laid out and developed from the start as legally binding prescribed modes of behaviour. Therefore, the significance of information factor will increase by many times. States will have to put in order their own preferences in that area, both preferences they have already grown conscious of and those that are still based on intuition. The Russian Federation believes that the model for a United Nations information platform that it has proposed for collecting and disseminating monitoring information on objects and events in near-Earth space carries conviction.

The United States apparently does not share this position. However, the range of tasks the platform in its proposed format is to be entrusted with apparently depends on specific problems that will have to be addressed as part of the efforts to ensure space operations safety. In that sense, its expected potential will fully meet the stated goal. If there is no delay in establishing and activating the platform, then, in case efforts prove successful, it will already have been tried and tested by the time a suitable environment may have been created for higher-level regulation in line with the space traffic management concept. The functionality of this platform could be improved accordingly. Such a platform would make it possible to fully ensure that the principle of good faith is observed in the context of information exchanges in the interests of safety of space operations while creating conditions under which, in the area of information exchange, space safety interests become the primary concern and under no circumstances would be prevailed over by commercial considerations and/or interests of commercial entities. Enhancement of the functionality of such a United Nations platform would give it new technical characteristics. For example, it could be transformed into a distributed information system with several peer nodes having equal status. At the same time, the platform would remain the one single tool for information interaction between States. The annex to the present working paper contains a concise overview of the platform's technical concept.

Russian Federation: major policy move to leverage information-sharing internationally

5. The need for taking a prudent approach and implementing a strong policy with regard to ensuring safety and security in outer space has led to consideration by the Government of the Russian Federation of ways and means to ensure synergies and the functional integration of space monitoring capabilities that are already available or are being developed in the Russian Federation. Given the increasing requirements regarding safety of space operations and the international community's interest in obtaining near-Earth outer space monitoring information, the intention includes, among other things, focusing on bringing new emphasis to the competencies and prerogatives of key agencies and relevant organizations in the Russian Federation in order to develop and sustain a practice of provision by the Russian Federation of open access to the results of monitoring objects and events in outer space. It will be up to the Committee to determine the prospects of creating a United Nations information platform. For the practical implementation of transparency and confidence-building measures in outer space activities it would be essential that States and other providers and users of information pool their efforts through the platform. Such a mechanism would make it possible to increase by a score the completeness, accuracy and reliability of the monitoring information, because the information would be collected from various sources. This would constitute the advantage and unique character of the platform. Based on that understanding, the Russian Federation sets to establish a national information service whose function will be to provide open access to the results of monitoring objects and events in outer space. Should a decision be taken to establish a United Nations platform, that service will be adapted to the task of providing Russian informational inputs to the functioning of the platform.

Information factor as it relates to the space traffic management concept

6. The hypothetical effectuation and operation of a space traffic management regime will surely entail the need for a fundamentally new configuration of tools for ensuring space flight safety. It is quite predictable that such a context will make it necessary to somehow solve the formidable task of creating a fundamentally new organization of information and communication interaction between States. Such a mode of interaction would have to be based on the mandatory application of agreed

rules for decision-making in respect of operations in outer space. Tasks associated with space traffic management will undoubtedly be dealt with more efficiently, and the management mechanism will be completely transparent for all participants if reliance is placed on an international platform based on maintaining a jointly built database and following uniform rules for decision-making. One should proceed from the assumption that space traffic management in all its aspects implies a legal framework for interaction. The rationale behind the actions of those involved in outer space activities and their methods should be based on clear and mandatory criteria for conducting space operations. In particular it would be necessary to clearly set out and exhaustively standardize requirements with regard to information and its accuracy, completeness and the timeliness of its provision. Are States ready to assess, from a critical and analytical point of view, the rate and modalities of progress in this direction? Are those who seek to assume the role of a regulator in the domain of space situational awareness ready to carry out a functional reconditioning of their own planned policies and methods in the context of space traffic management? Detailed answers to these questions will undoubtedly be of great interest. Despite the diversity of ideas that are attributed the role of a reference baseline outlook on space traffic management, there have been no clear answers so far.

Intellectual discourse in the business and academic communities

7. It may seem that there is an abundance of sources of political and technical perspectives on what may constitute space traffic management. Both private businesses and academic circles (in particular inside the International Academy of Astronautics) suggest ways of defining the framework for such management. Companies in the United States, in particular Lockheed Martin and Boeing, are becoming increasingly involved in establishing competencies in this area and, rely on a behavioural pattern that displays readiness to set goals for their Government. The issue has two dimensions: on one hand, the companies are suggesting traffic management concepts; on the other hand they , have, in fact identified the way towards accelerated transition to potentially wide range of goods and services that would supposedly serve the tasks of such management. Lockheed Martin Corporation was perhaps the first company to raise the issue of space traffic “control” in its research. Assuming that Lockheed Martin Corporation did not imply that this term meant quite what it meant in the space operations documents adopted in the United States, the word “control”, as used in the present context, in any case has a much stronger meaning. Unlike the word “management”, which essentially means a set of procedures for coordinating actions, “control” implies a prescriptive, mandatory system for regulating activities of those engaged in space traffic. For example, space flight control means direct control of a space object by issuing commands, including for active control actions. The resolve of private companies to deal with the issue of space traffic management obliges one to bear in mind the need to fully meet the requirements of article VI of the 1967 Outer Space Treaty, which provide that the activities of non-governmental entities in outer space shall require authorization and continuing supervision by the appropriate State party to the Treaty. There should be an exchange of ideas between private companies and their respective Governments and between business circles and the international academic community, but that interaction must be based on each participant in the discussions on this complex issue having a clear understanding of its own unique competence. The industry should act as a driver of new ideas. Preserving the integrity of the independent expert community is a prerequisite for the success of real negotiations on space traffic management in the future. The impartiality of the scientific community should not be tampered with. In general, partisanship, if unavoidable or even warranted in specific cases, should be kept within bounds, and the choice made should be subject to critical scrutiny. It is

unacceptable to make the expert community “socialize” particular viewpoints and serve the interests of specific States, groups of States or corporations.

Identification of ideas and approaches used in the domains of air traffic and telecommunications regulations that could be used for the purposes of conceptualizing space traffic management

8. There seems to be a rather notable growth of interest in the topic of space traffic management on the part of representatives of the International Telecommunication Union (ITU) and the secretariat of the International Civil Aviation Organization (ICAO). One can observe a certain pattern of events that seems to form a trend indicating a desire to configure precepts to regulate traffic in space. It cannot be denied that the initiatives shown both in the ITU and within ICAO in recent years are conducive to the evolution of ideas regarding the feasibility of the development and practical implementation of potential elements of a space traffic management system. ITU, through the chief of its space services department, was right to say that, in order to successfully ensure safety within the framework of a space traffic management concept, it is necessary to consider the crucial importance of functions that are necessary for conducting space operations, such as telemetry, tracking and telecommand. It is worth noting in that regard that enabling such functions can also be highly relevant in the context of regulating the safety of space operations within the framework of the set of draft guidelines for the long-term sustainability of outer space activities that is being developed. Careful consideration of a number of draft guidelines proposed by the Russian Federation would convincingly show that it is already possible to solve those issues in all their aspects at the current stage. The ICAO secretariat generates ideas implying in one way or another that the rules governing management and control of air traffic could prove to be useful in creating a space traffic management regime. At the same time, outside ICAO, there are views being expressed that ICAO norms may have a direct and strong effect on the concept and practice of space traffic management. Whether such views are rightful can be challenged, at the very least, based on the substantial differences in the types of objects generating air traffic and space traffic. In the case of air traffic, controlled vehicles form the absolute majority. As for space traffic, the share of functioning (controlled) spacecraft of the total number of trackable objects is now only about 5 per cent. Besides, by no means all spacecraft have the capacity to manoeuvre. It is, therefore, clear that, objectively, it would not be possible to rely heavily on the borrowing of ICAO norms and their extrapolation to about 95 per cent of trackable but uncontrolled objects. Irrespective of the above, a whole series of ideas underlying air traffic control standards could be duly analysed with respect to their possible use not only for the purposes of hypothetical space traffic management, but also in the regulation of safety of space operations. In that context it may be appropriate to pay attention to ICAO requirements related, inter alia, to: formation flight, proximity operations, collision avoidance measures, provision of flight plans and their amendments, use of radio beacons, classification and identification of aircraft, provision of updated aircraft position reports, and use of the same time standards and units of measurement. If States analyse the draft guidelines for the safety of space operations proposed by the Russian Federation objectively and without bias, they will easily see the similarities between the proposed regulations and those ensured within the framework of ICAO and considered by that Organization to be of the highest level of safety and efficiency. Thus, comprehensive regulation of the safety of space operations has a real potential to shape the general concept of space traffic management. It is objectively difficult to analyse the issue of developing a set of criteria that can, in the event of a potential collision between two space objects, be used to identify unambiguously the space object that will have the priority right to continue its flight according to its own trajectory without a mandatory change of such

trajectory. A solution to this issue can be conceived within the framework of a single, carefully adjusted international information system. The idea currently being circulated in the international debate of imposing restrictions on certain activities in certain regions of outer space due to their congestion (“orbit zoning”) should be treated with great caution, as there are neither universally recognized criteria to determine the degree of congestion of a particular orbit, nor is there a general concept of an institutional basis for taking decisions in this regard.

Ideas on an integrated approach to addressing safety and security issues

9. The development of a space traffic management model remains a significant analytical problem and a daunting task from both a legal and a technical standpoint. It takes time to thoroughly research this issue. The immediate prerequisites for adopting well-reasoned decisions in this regard have not emerged. Within the framework of the evolving concept for ensuring the long-term sustainability of outer space activities, the subject of safety of space operations encompasses many of the same issues that underlie the ideas and thoughts related to space traffic management. Solutions in the field of safety of space operations, therefore, should precede any serious efforts to conceptualize space traffic management. Thus it is a priority to salvage rationality in negotiations within the Scientific and Technical Subcommittee and to work out ways to support sensible decisions within that forum. If the deliberations on the subject of safety yield negative results, there will be no understanding on much more complicated issues of space traffic management. Considering these circumstances it would be premature to make space traffic management a permanent agenda item. In those circumstances, any potential complaints about negative consequences of the Committee’s discontinuous involvement in the development of that topic can be caused by either insufficient understanding of space security issues or attempts to fetishize fast-and-easy solutions to make a part of the international community coalesce around an ill-advised and flawed approach to the development of new arrangements for space conduct.

Annex

The United Nations information platform as a larger configuration of competencies in the domain of sharing information on objects and events in outer space

1. The platform is seen as a mechanism that integrates efforts made by States, international intergovernmental organizations, spacecraft operators, and specialized national and international non-governmental organizations in collecting, systemizing, sharing and analysing information on the monitoring of objects and events in outer space. More specifically, the platform is to be used for:

(a) Providing the world community, on a centralized basis, with information on objects (already in orbit or due to be launched) and events (those that are planned or forecast and those that have occurred) in near-Earth space;

(b) Providing information on potential hazards for operational space objects posed by other objects in near-Earth space;

(c) Ensuring the centralized accumulation of information possessed by various providers on objects and events with a view to making available data required for conducting analysis of the situation in outer space and making necessary decisions more complete, reliable, accurate and timely;

(d) Ensuring the unified interpretation of each type of information on space objects and providing a unified mechanism for accounting for space objects and correlating monitoring information with those objects;

(e) Assisting in the prevention of potentially hazardous situations in outer space.

2. Entities authorized by States, spacecraft operators, space monitoring organizations and organizations that process and analyse monitoring data may act as providers of information for the platform. All providers, as well as any other natural persons and legal entities authorized by the platform operator (the United Nations) may be users of the platform information.

3. The platform is meant to become a generally available mechanism for authorized hosting and authorized access to monitoring information. The issue of authorization can very well be solved at the stage when the technical project of the platform is worked out in detail.

4. It is assumed that the platform should operate as a tool for transmitting and receiving factual information on objects and events in outer space. This means that information on objects and events should be provided together with an assessment of or characteristics showing its accuracy, reliability, completeness and the period of time of its applicability. Availability of those assessments or characteristics is an indispensable condition for properly correlating information on the same objects and events in outer space that would be entered into the platform database by various providers. Any information provider is able to furnish such assessments or characteristics.

5. The fact that priority must be given to factual, objective, information on objects and events in outer space does not preclude that the platform database may, in addition to such information, contain accompanying comments or the results of orbital event analyses.

6. The platform is conceived as a powerful tool for increasing predictability and building confidence in the domain of space activities. A function of accounting for objects and events in outer space on a unified basis could be developed within the platform. Obviously, the more successful the advancement towards increasing the level of trust, the more incentives there would be for consistently increasing the nomenclature and volume of the information that providers are ready and able to enter into the platform database.

7. An exhaustive list of space launches performed and space objects launched has to be developed as a high-priority measure for starting the process of filling up the platform database. Of major interest are unique identifiers (international designations) assigned to space objects. For this purpose, the Register of Objects Launched into Outer Space that is maintained by the United Nations should be used. In keeping with that, it would be logical to charge the Office for Outer Space Affairs of the Secretariat with the task of compiling such a list. Following certain procedures (that would be subject to approval and would not be burdensome), States would confirm that the prepared list is correct. The information in the agreed list of space launches and launched space objects should become the foundation for initial platform database provisioning. When new launches are performed and new objects appear on orbit, the information on those launches and objects would be entered directly into the platform database. Any new information characterizing the situation in near-Earth space should be entered into the database in relation to a specific space object or event.

8. It would be erroneous to believe that the platform will not be needed in the event that a number of States possessing monitoring means pursue a policy providing for the availability of open national services for sharing information on objects and events in outer space. In order to get reliable results when fusing the information provided by such services, users will inevitably have to set up a highly reliable correspondence between the designations and other characteristics of the same objects and events in different databases. Such a task would be very complicated and practically impossible to accomplish for the vast majority of monitoring information users. The platform will be a unified mechanism for keeping records on objects and events, enabling information providers to link the transferred data destined for sharing to a specific space object or event and to do it in the best way possible.

9. The following are the lists of potential providers of various types of information on objects and events meant to be recorded in the platform database:

- (a) For scheduled launches:
 - (i) States (organizations) actually preparing the launch;
 - (ii) States that, in the event of a successful launch, will exercise jurisdiction and control over the launched space objects;
 - (iii) Organizations owning and/or operating the spacecraft scheduled for launching;
- (b) For performed launches and launched space objects:
 - (i) States (organizations) that performed the launch;
 - (ii) States exercising jurisdiction and control over the space objects launched into orbit;
 - (iii) States (organizations) possessing monitoring means;
- (c) For functioning space objects in orbit:
 - (i) States (organizations) owning and/or operating the spacecraft;

- (ii) States (organizations) possessing monitoring means;
- (d) For non-functioning space objects in orbit:
 - (i) States (organizations) possessing monitoring means;
- (e) For predicted conjunctions of space objects and on conjunctions that have occurred:
 - (i) States (organizations) possessing monitoring means;
 - (ii) Organizations processing and analysing monitoring data;
- (f) For predicted re-entries of space objects and re-entries that have occurred:
 - (i) States (organizations) exercising jurisdiction and control over the space object;
 - (ii) States (organizations) possessing monitoring means;
 - (iii) States in which a space object or its fragments that reached the Earth's surface have been found;
- (g) For fragmentation of space objects in orbit:
 - (i) States (organizations) exercising jurisdiction and control over the space object;
 - (ii) States (organizations) possessing monitoring means;
 - (iii) Organizations processing and analysing monitoring data;
- (h) For scheduled and conducted in-orbit operations:
 - (i) Organizations owning and/or operating the space vehicles launched into orbit;
 - (ii) States (organizations) possessing monitoring means;
- (i) For changes of the status of a space object (termination or resumption of operation):
 - (i) Organizations owning and/or operating the spacecraft launched into orbit;
 - (ii) States (organizations) possessing monitoring means;
 - (iii) Organizations processing and analysing monitoring data;
- (j) For new space objects discovered by near-Earth space monitoring means:
 - (i) States (organizations) possessing monitoring means.
