United Nations A/AC.105/L.303

General Assembly

Distr.: Limited
16 March 2016

Original: English and Russian

Committee on the Peaceful Uses of Outer Space
Fifty-ninth session
Vienna, 8-17 June 2016

Considerations on the set of prime requirements and factors that should shape the policy of international information-sharing serving safety of space operations

Working paper submitted by the Russian Federation

I. Current status of diverse interrelated issues pertaining to sharing information on objects and events in outer space

The positive results achieved so far in clarifying informational aspects of ensuring safety of space operations remain limited and incommensurate with the task of developing internationally applied methods of sharing information on objects and events in near-Earth outer space

1. Expert group B of the Working Group on the Long-term Sustainability of Outer Space Activities began actual work on the topic of adequate information support in the interests of space operations safety in 2013. Decisions have been made in favour of: improving the completeness, reliability and accuracy of information on the orbits and the physical characteristics of space objects; using agreed methods for information processing in order to ensure coherent interpretation of results obtained; and consolidating common understanding of the ways to develop methods and means of receiving and collecting information on space objects. In one way or another, the idea of the importance of sharing information on space objects and events has been established. However, despite all the positive results achieved it would still be too early to speak of the completion of the work on the information aspects of space security.

V.16-01554 (E)

Overview of the two currently proposed approaches to centralizing the functions of collecting and distributing information on objects and events in outer space and the different intrinsic motivation underlying each approach

2. The Russian Federation is known to believe that this problem could be solved by establishing an information platform under the auspices of the United Nations. The mechanism for establishing cooperation in this area on the basis of the platform would be qualitatively different from any other similar cooperation schemes: first and foremost, it would initially be designed in a universal manner based on the principle of solidarity of contributions (which may be differentiated but remain unique in their own way), with the clear function of tackling safety/security issues beyond any specific national and/or corporate paradigms that could be driven by vested interests (commercial, political or military). Such a mechanism would stand in significant contrast, in particular, to the concept of information support, as set forth in the draft code of conduct for outer space activities, both in terms of the objectives sought and the tasks set. The draft code does not elucidate the main intriguing aspect diligently embedded in that document by its authors and co-sponsors, namely: who determines the justification of supra-jurisdictional coercive measures against foreign space objects under various groundless pretexts and on what basis is such justification determined. In fact, it is easy to surmise which national authority the drafters have in mind as the one endowed with core competence to exercise key functions of delivering information on potentially hazardous situations in outer space. Attention should be drawn to the fact that, according to the draft code, its subscribing States will designate a central point of contact and task it with relevant functions. Thus, the question of establishing a mechanism or structure by joint efforts is not raised at all. It is doubtful that the sponsors and, above all, the co-sponsors of the code meant any other State besides the one that is inclined to claim “leadership in outer space”.

Positive aspects and objective constraints associated with current bilateral practices in the field of space situational awareness services and information

3. The issues of information provision could be analysed from a different perspective, namely from the point of view of existing cooperation practices in the framework of which information exchange is implemented on a bilateral basis. For example, of relevance are bilateral agreements on the provision of space situational awareness services and information concluded by the United States of America with its allies and friendly countries. Notwithstanding the positive experience that parties to cooperation under such agreements may gain, the very format of such cooperation makes it impossible to avoid constraints. Of course, the fact that the State that is a party to each of the bilateral agreements on information exchange retains undeniable benefits may not be regarded as a drawback. In particular, it would be of interest to know who would define the rules for the use of the entire collection of such information. Purely formal aspects of the handling of the information exchanged seem to be addressed in such agreements, whereas solutions of major problems related to development and use of common criteria for and methods of verification of the accuracy of information, processing of information and, most importantly, the procedure for adopting decisions on the basis of information acquired are either not readily available in open sources or do not exist at all. Such needs have to be embraced if a serious attempt is to be made to organize results-oriented information-sharing. It is well known that the agreements concluded

by, and the national law of, the United States provides for the clause that the recipients of space situational awareness services and information should "agree to pay an amount that may be charged". The language of the agreements and the law does not provide for full clarity on this issue. If it is to be presumed — either in the context of the above agreements or regardless of them — that truly effective sharing of information on objects and events in near-Earth outer space is to serve the general good of the whole international community (i.e. produce comprehensive benefits in terms of ensuring safety of space operations), as opposed to information-sharing within any other paradigms, then a consensus decision should be that information which is crucial for the safety of space operations is to be provided free of charge. States may have different perceptions of what constitutes necessary and sufficient information. The indicative list of information necessary for the operation of the United Nations information platform, as presented in the working paper by the Russian Federation A/AC.105/L.290, as well as in annex II to the present working paper, gives an understanding of the categories of information and specific attributes (parameters for describing those categories) that the Russian Federation considers to be essential.

States should take steps towards attaining unity of views on the functional aspects of international information interaction and ensure the resolution of key outstanding issues

4. Information on the situation in outer space may differ quite significantly — it can be based either on measurements and results of their processing or on prediction models as well as on expert analysis. There is also a variety of sources and methods of obtaining information. At present, the provider of information defines to a large extent the completeness of this information as applied to a specific situation in outer space, its accuracy, frequency of updates and the format in which it is provided. As a result, information on the same object or event in outer space compiled by different providers may turn out to be incompatible (particularly, in terms of motion models, accuracy evaluation models and models of event probability calculation). As a consequence, tackling the issues involved in ensuring the safety of space operations would be difficult or even impossible. In that context, ensuring the synergy of information on the same objects and events in outer space obtained from different sources would be conceivable only if formalized procedures for generating and processing information are developed. It needs to be understood that, if adopted, the draft guidelines that seem to command consensus would only partially facilitate the accomplishment of all challenging tasks in that area. One such draft guideline contemplates the introduction of standard procedures to identify dangerous conjunctions and evaluate the risk of collisions. It builds significantly on the approach characteristic of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, envisaging, besides the general emphasis on the need for activities to identify dangerous conjunctions of space objects, certain consecutive actions necessary to tackle this issue. The problem, however, is that this chain of actions is missing certain key links, specifically the draft guideline does not stipulate the need for all operators to follow a single procedure for evaluating the risk of collision and making the decision on the need to perform an avoidance manoeuvre. Thus, by and large, the problem of preventing potential collisions in outer space has not been resolved. In fact, the present situation, where there is no single decision-making algorithm for all operators in the

event of a forecast dangerous conjunction, remains unchanged. In other words, the draft guidelines concerning various aspects of working with information essentially reflect the fact that at present just a few standards exist at the international level that regulate mainly the form in which the information is provided and that apply to only a limited number of categories of information.

States should increase awareness of the need, and proceed with practical efforts, to generate willingness and competency for developing universal standards for assessing the risk of various events in outer space that would serve the purposes of international interaction

5. Currently, there are no internationally recognized universal standards for assessing the risk of various events, assessing the appropriateness of using certain information in a given situation or fusing information obtained from various sources. As may be understood, in the framework of the bilateral agreements on exchange of information on the situation in outer space, as referred to in paragraph 3 of the present working paper, these aspects are not specifically elaborated either. Effective international interaction requires additional special uniform standards for generating, providing, verifying, interpreting, fusing and using information. This idea should be clearly established in the guidelines. The ultimate goal of international regulation should be to reach a much higher level of information support for the safety of space operations. The organizational forms of interaction in the information area are yet to be decided. The need to ensure a state of affairs where the recipients of information are truly in a position to use information from various sources while being effectively guided by necessary uniform standards is of key importance. It can be confidently presumed that the development of international standards on the information aspects of safety of space operations will eventually be carried out in the framework of the International Organization for Standardization (ISO) and/or the Consultative Committee for Space Data Systems. Such standards include, inter alia, potential unified requirements for orbital information (meeting these requirements would allow comparison of information on the same space objects generated from information supplied by different providers); requirements for completeness and accuracy of information (on the orbital parameters of approaching space objects, on the shape and attitude of these objects), which is essential for assessing the risk of collision and deciding whether the operation to avoid a potential collision is needed. When developing such standards, it is important to provide feedback to the Committee on the Peaceful Uses of Outer Space. Such feedback should be considered one of the mechanisms that further the practical success of the effective and comprehensive implementation of guidelines for the long-term sustainability of outer space activities. With all the trust vested in the above-mentioned negotiating platforms, it is namely the Scientific and Technical Subcommittee and the Committee as a whole that will have to become the forums within which States jointly formulate a selected set of agreed perspectives on the pivotal aspects of standardization in the field of information support for space operations. Approaches agreed within the Committee should be taken into account by ISO and the Consultative Committee in their work. Such a proliferation of efforts will enable all Member States to adopt, by consensus, major decisions essential for the integrity of regulations governing technically highly complex and politically sensitive issues.

II. Considerations to be addressed in conceptualizing the objectives and tasks of the expert group on objects and events in outer space

Elucidative comments on the position of the Russian Federation regarding possible establishment of an expert group

6. The fact that the idea of establishing an expert group that could thoroughly address issues of information interaction with a view to ensuring the safety of space operations is being discussed more actively (preliminary exchanges of views on the subject took place on the margins of the fifty-eighth session of the Committee, as well as during the intersessional informal meetings of the Working Group on the Long-term Sustainability of Outer Space Activities in Vienna in October 2015) necessitates taking into account the background to this idea and understanding the prospects for its realization. Actually, in its nascent form, the idea of creating a dedicated expert group on the information aspects of monitoring the situation in outer space was put forward in an impromptu fashion by the representative of the United Kingdom of Great Britain and Northern Ireland in an effort to assist in overcoming the difficulties in the negotiating process at the fifty-second session of the Scientific and Technical Subcommittee that had arisen because the United States blocked the Russian proposal for the Subcommittee to request from the Office for Outer Space Affairs a review on the organizational and technical capabilities that exist in this structure that could be used to create an information platform on its basis. The initiative put forward by the representative of the United Kingdom received a positive response from a number of delegations and was summarized in paragraph 249 of the Report of the Subcommittee (A/AC.105/1088). According to that report, the expert group tasks are associated with consideration of the full spectrum of issues related to the collecting and sharing of information on near-Earth space monitoring and consideration of existing provisions and appropriate procedures for such information exchange related to actual and potential situations in near-Earth outer space. In its working paper A/AC.105/C.1/L.345, the Russian Federation speaks in favour of the Scientific and Technical Subcommittee supporting the establishment of that particular type of group, as the issues of information support for space operations safety should be addressed thoroughly. For this reason, the same working paper of the Russian Federation identifies the aspects of information support for security in outer space that should be given priority. It primarily covers the development of uniform requirements for data provided for common use by a variety of sources, as well as approaches to processing an integral collection of such data. Compared to this understanding of the tasks, the proposal of the United States, as set out in its working paper A/AC.105/C.1/L.347, produces the effect of a significant repositioning of the functions of the potential expert group. Actually, the line of thinking is different. The position of the Russian Federation on the establishment of the expert group calls for detailed comment. It is utterly transparent and pragmatic and should therefore not be misinterpreted or become the subject of speculation, especially since the Russian Federation has no intention of departing from its earlier balanced and rational stance.

The proposal of the United States on the expert group lacks ambition to solve the pivotal issue of arranging for the fusion of multi-source information

7. First of all, it is noteworthy, that the working paper of the United States makes no mention of the important aspect of ensuring awareness among States of the situation in outer space as creating prerequisites for developing common approaches to the provision and use of space monitoring information from a variety of independent sources. In practical terms, such alteration of the potential discourse may signify a lack of interest in the internationalization of efforts to consider the aspects related to the ways and means of ensuring a multilateral institutional basis for superior cooperation in the sharing and the common use of information on the situation in outer space. Ultimately, such cooperation provides for joint formulation, structuring and subsequent implementation of a set of requirements that would enable a commonality of views on how the information should be provided and processed in the framework of international interaction and how the decisions on its usability should be taken. Ideally, efforts should be focused on establishing a centralized international database as a functional addition to the existing national and integrated international capabilities in the area of monitoring and assessment of the situation in outer space. The conclusion is obvious: the collection and fusion of multi-source information should not be neglected in the work of the potential expert group. It would be of interest to obtain clarification as to why the United States does not propose to discuss these issues within the expert group, if only because the architects of the draft code of conduct for outer space activities and the United States, as its co-sponsor, had definite aspirations to provide for the creation of some sort of electronic database for collecting and distributing notifications and information.

Simply reviewing existing practices will not be a winning choice for States

8. Essentially, the direct and immediate message of the United States working paper is to replace discussion of the issues of informational support for the safety of space operations with a mere review of existing international practices in the area of sharing information on monitoring objects and events in outer space. Yet this would not be sufficient. Such a review would certainly make sense as there really are issues that can be discussed: both the advantages of current international practices and their inherent deficiencies and inadequacies. Nevertheless, the implications embedded in the working paper and connotations and generalizations inherent in its descriptive element do not give an adequate picture of what the entire set of tasks and functions of this expert group could be. All participants in the negotiations should have a responsible and informed understanding of the need for effective solutions capable of clearly determining the course of development of international information interaction. The much needed changes in this field are multifaceted. In order to acquire a truly quality information product within any form of international interaction, the joint efforts of States to analyse the situation in outer space and mitigate possible hazards should be based on agreed methods and algorithms. At the same time, such joint activities should be carried out in the context of a specific regulatory framework that should be embodied in the set of guidelines for the long-term sustainability of outer space activities. Such a regulatory framework should encompass critical understandings on establishing and sustaining at the international level a system for ensuring safety of space operations. Annex I to the present working paper provides the comparative analysis of the two approaches to dealing

with the issue of information-sharing — taking as the basis the arrangements that the United States is reaching with its allies, on the one hand, and using the potentiality of the United Nations information platform — on the other. Such a comparison is based on the exhaustive list of services provided for in one such arrangement, i.e. the memorandum of understanding on the subject matter between the United States and Japan. The task would consist of analysing and laying out relevant issues in a fair way, with no intention to detract from whatever reputations might be involved. Such analysis affords the opportunity to better understand what circumstances set limits to current practices and where the platform may supersede such practices.

Issues of information-sharing cannot be isolated from the need to bring into effect space operation safety requirements

9. The context of the discussion on establishing an expert group is of importance. First of all, the distinctive feature of the current situation is that managing the safety of space operations is at risk of not materializing at all, as the informal intersessional meetings of the Working Group on the Long-term Sustainability of Outer Space Activities in Vienna in October 2015 have convincingly shown. The United States is not ready to engage in any substantive arrangements for such safety. The question of whether the Working Group would be able to achieve actual results in developing the regulatory framework for the safety of space operations is pivotal in the light of the discussion on establishing an expert group on objects and events in outer space. It stands to reason that if the Working Group on the Long-term Sustainability of Outer Space Activities reaches the endpoint of its political life by terminating its activities with an unmitigated failure to address the safety issues, the prerequisites for establishing an expert group and its functioning will not emerge. The pressing issues of information provision cannot be solved in an optimal manner if treated in a kind of separate dimension, in isolation from managing the safety of space operations.

States should realize the need to increase knowledge and avoid intellectual pitfalls

10. The set of substantive and procedural arrangements in the field of safety of space operations proposed by the Russian Federation and the terms of their implementation have been designed to effectively overcome obstacles to information exchange. There is a need to dispel the misapprehension that the substantive regulation of the safety of space operations can be overlooked when designing procedures and mechanisms for information interaction. Russian representatives are consistent in their efforts to explain to their counterparts all current interconnections in this field. It is becoming extremely important for the participants in negotiations to pursue a deeper knowledge of the subject matter under consideration and develop a more proactive stance towards it. The Russian proposals are so serious and systemic that it is not enough simply to make a bureaucratic assessment of the proposed solutions; if there is an attempt to reject these proposals, it should be well grounded. Failure or reluctance on the part of some participants in negotiations to at least check the fact-based interconnections between information-sharing and safety enhancement is becoming a major negative factor adversely affecting the negotiations. The draft guidelines ensuring the long-term sustainability of outer space activities that are under discussion have

either a direct or a very important indirect bearing on leveraging capabilities to support policy and regulatory frameworks to effectively deal with information-sharing. A number of vivid and instructive examples can be cited to illustrate to what degree fundamental prerequisites for the pursuit of this objective are conditioned by the existence of equally effective regulation of safety of space operation. As pointed out in paragraph 4 of the present working paper, a range of potentially significant draft guidelines, which are currently at an advanced drafting stage, nevertheless require substantial further elaboration so as to duly identify and clarify the information aspects of the procedures they envisage. It is essential that the States which are unwilling to commit to serious discussion of a whole number of draft guidelines submitted by the Russian Federation should finally realize that the Russian proposals are directly relevant to identifying ways and means of enhancing the effectiveness of information interaction in the field of safety of space operation. The following examples are worth citing:

(a) Some delegations are known to consider the draft guideline on consistent enhancement of the practice in registering space objects to be unjustified in practical terms. However, it incorporates all the necessary aspects of an integrated approach to addressing a number of issues of safety of space operations through tangible improvement of space object registration. For instance, there is a matter that is not fully covered in the 1975 Convention on Registration of Objects Launched into Outer Space, namely: parameters of precisely which orbit (initial/parking, transfer, target or insertion orbit) should be provided under article IV of the Convention. As regards the Russian Federation, it is a standing practice to specify, as part of the procedure for registering space objects under its jurisdiction and control, insertion orbit parameters. From the standpoint of space security, specifying the parameters of the insertion or target orbits (where objects spend most of their life cycles) is optimal, since it enables correct identification of objects for a substantially long period. The United States, primarily, employs a similar approach, although it sporadically elects to specify initial/parking or transfer orbit parameters, where a space object essentially spends a few hours at most. The fact of the matter is that by the time the United Nations is furnished with registration information, the data on orbit parameters of the launched space objects it contains a priori fail to describe the actual part of outer space where the space object is physically placed. This practice substantially complicates identification of such objects at the subsequent stages of their flight. Seeking to prevent such problems, the Russian Federation proposed in the draft guideline that every time a space object is moved to another area of near-Earth space, the State that exercises jurisdiction and control over that object should provide additional information on the matter;

(b) The Russian Federation highlighted the need to restore and provide, through the Office for Outer Space Affairs, continuity in maintaining the international practice, previously used for decades but abandoned in July 2011, of assigning international designations to orbital launches and orbital objects in compliance with the system developed by the Committee on Space Research (COSPAR) as far back as the early 1960s. An international designation is a unique identifier assigned to each space object launched into Earth orbit or farther into outer space that allows unambiguous identification of each space object in the United Nations Register and national databases. Since July 2011, in order to assign international designations that match each object under their jurisdiction and

control, the registering States have to use information from various open sources that may have errors made when creating international designations, as well as when referring a certain space object to its international designation. Unfortunately, some negotiators can barely tell the difference between "international designation of a space object" and other designations and names that can be assigned to an object at the national level or by its operators. Each registering State has the right to assign any registration number and name to a space object under its jurisdiction and control that can further be submitted for inclusion in the United Nations Register. However, an international designation of a space object as a unique identifier can only be created by a centralized international mechanism that prevents duplications, omissions and errors;

(c) Excluding the possibility of collisions of a launch vehicle in its launch phase with space objects already in orbit is an integral part of ensuring the safety of space operations. All the participants in expert group B have agreed with this assertion. Moreover, some launching States are already trying to address this complex problem. However, as in the case of potentially dangerous conjunctions of orbital objects, it is clear that this issue can be effectively solved only through close cooperation between launching States and States capable of obtaining monitoring information on space objects. One of the key aspects of such cooperation is to develop and introduce a single international standard for describing and sharing information on the nominal trajectory of the flight of the launch vehicle at the phase of spacecraft (payload) launch. That is why the relevant draft guideline submitted by the Russian Federation seeks to develop and apply this standard;

(d) The Russian Federation proposed to consider the possibility of providing prior notifications on launches as one priority measure in the context of information interaction between States in order to increase the safety of space operations and enhance transparency in outer space activities. Such notifications would contain information on the dates and times of planned launches and types of launch vehicles, as well as basic information on space objects to be launched into orbit with an indication of near-Earth target areas to be used by the newly launched space objects and/or basic parameters of the nominal orbit for each object and the possible dispersion of their values. It would be reasonable to provide such notifications in a common form for all the States and with the use of mechanisms and procedures of information interaction, which would allow such notifications to be brought to the attention of all interested participants in space activities;

(e) In its working papers and in connection with the draft guidelines it proposed earlier, the Russian Federation has repeatedly emphasized that States and international intergovernmental organizations should consistently strive to focus their joint efforts on creating and maintaining the procedures and mechanisms which could be used to effectively consider and address individual and common needs in identifying objects in orbit. In terms of ensuring the safety of space operations, this is one of the key elements of information interaction. Without this element it will be impossible to take decisions on the active removal and intentional destruction of space objects whose origin and status have not been reliably determined. The problem of space object identification can be solved through close information interaction between all the States and international organizations capable of monitoring outer space. The reliability of identification depends primarily on the level of information interaction organized by joint efforts so as to

ensure the aggregation of monitoring information received from different providers, taking into account that no individual State has any actual possibility of conducting near-continuous global monitoring of entire near-Earth space.

Why is the United States anchoring the initiative on the information platform?

11. During the 2015 session of the Scientific and Technical Subcommittee, delegations witnessed an inadequate reaction on the part of the United States to the proposal made by the Russian Federation and supported by a number of States, including China, to address the Office for Outer Space Affairs, on behalf of the Subcommittee, with a request to conduct a preliminary study of the possibility of locating the information platform within the Office. The United States blocked this rather reasonable idea. The unwisdom of that position is self-evident, because the issue was to understand what technical means available to the Office (or the United Nations Office at Vienna as a whole) could be adapted for platform requirements, what additional basic and auxiliary equipment would it be reasonable to acquire and what result could ultimately be achieved in terms of the requirements of the possible new functional unit of the Office for Outer Space Affairs. It is quite obvious that the review document on this subject should be drafted in full harmony with the criteria of reasonable financial costs. However, the United States did not give any substantive explanation of its frustration at the Russian proposal or its refusal to integrate all-source information in a single United Nations structure capable of producing enhanced information products. Can the United States convincingly answer why it is necessary to invariably resist checking (in a strictly preliminary way) the quite rational hypothesis of establishing the platform, and comparing its presumed advantages, with the flaws and inadequacies of current international practices? Why not try to reconcile political attitudes to the rational assumptions associated with the platform? There are not so many suppositions as to what may lie at the root of such opposition to establishing the platform. The most obvious answer relates to the fact that the United States regards its own capacity to provide information on the situation in outer space as a symbol and quintessence of its declared policy of domination and power projection into outer space. The loss of such an attribute would probably be assessed by the United States as unacceptable in terms of an unwelcome shift in the structure of power. Projection of power, if not perceived in an abstract way, surely presupposes the use of different methods and techniques to achieve the desired political ends. Apparently, the United States is not ready for transformation on such a scale and, consequently, does not want the platform factor to intervene in its strategy. Counting on the ascendancy of one particular national space monitoring system is erroneous and has no prospects. What is left is to count on one thing, i.e. that the United States, together with its allies, having taken a long view of their interests, will ultimately sense the common benefits that could be derived from the platform and will cease obstructing the sound proposal to have the modalities of establishing the platform thoroughly discussed.

The establishment of the United Nations information platform should remain a matter of central importance and relevance in developing approaches to information support for the safety of space operations

12. Apparently, the United States believes that the establishment of an expert group under its leadership should be perceived as a bonus which would compensate

for its blocking the idea of creating a United Nations information platform. As long as in its working paper the United States largely relies on the conclusions and recommendations contained in the report of expert group B of the Working Group on the Long-term Sustainability of Outer Space Activities, it should be borne in mind that this report explicitly refers to a cooperation mechanism associated with the platform and regarded as a possible option for providing information support for accomplishing the tasks of ensuring safety of space operations. Therefore, any discussion of the prospects for creating an expert group should suggest that — as a priority measure — the United States unblock the adoption of the decision that almost came to fruition in the Scientific and Technical Subcommittee on submitting the above-mentioned request to the Office for Outer Space Affairs, especially as the Secretariat's tasks would be greatly facilitated by the efforts of the Russian Federation that made it possible for the Subcommittee and the Office to have at their disposal significant elaborations on major programmatic and logistical aspects of platform operation. The review material prepared by the Office would be of great practical value for further productive discussions on the information aspects of safety in outer space, both within, or irrespective of, a potential expert group.

Bringing proper focus to the idea of the expert group

13. The idea of establishing the expert group is worthy of further discussion. It is necessary to bring order and meaning to all the respective aspects of its establishment and activities. The Russian Federation seeks to ensure that the actions it takes regarding this issue are well considered and aligned with a general pragmatic stance. Such a stance requires that the request for the expert group should undergo a significant change in focus. The Russian vision of how to put the expert group into perspective has been shaped by the following assumptions that take into consideration the factors that make for the success of the possible new endeavour:

(a) There should be a general clear understanding that the development of international practices concerning the supply of information must draw on specific international regulations related to the safety of space operations. Consequently, giving real, objective form to the requirements in the field of information interaction between States is directly dependent on the development and implementation of a range of solutions to vital safety and security problems. Unless the group of States that have chosen a politically motivated course of direct opposition to working out a regime governing the safety of space operations changes its inner motivation, the situation of an imminent disintegration of the negotiating process will inevitably evolve. Such a scenario will render the idea of establishing an expert group completely irrelevant;

(b) Given the current uncertain prospects of developing a set of guidelines, it would be reasonable, first of all, to discuss within the Working Group on the Long-term Sustainability of Outer Space Activities what results the expert group on objects and events in outer space could, in principle, be expected to reach taking into account all the relevant circumstances. Such a discussion would help, inter alia, to decide whether it is appropriate to establish the proposed expert group as part of the existing Working Group on the Long-term Sustainability of Outer Space Activities within a reasonably extended mandate. It is to be expected that many will be critical of such a prospect, and it is very likely that they will base their criticism on the precedent-setting decision to establish a separate Expert Group on Space

Weather. A reasonable counterargument to give to potential critics would be that space weather has for many years been discussed by the Scientific and Technical Subcommittee without States taking dramatically opposing positions, quite unlike what is obviously and unfortunately happening in the work on the safety of space operations;

(c) There is a need to visualize, in a wider context, the concrete objectives to be pursued by the expert group. The drafters of working paper A/AC.105/C.1/L.347 have failed to identify and describe any specific problems to be solved by the expert group. They did not set themselves the task of providing the Scientific and Technical Subcommittee with impressive generalized ideas, or at least some analytic insights or prescriptions for possible actions on the part of States. One does not get the impression that they have an idea of, or intuition for, any fresh solutions to the problems under consideration. Without understanding the ultimate goals, a review of existing practices, as proposed by the United States, would be a pure waste of time and resources. The drafters of the working paper put special emphasis on its paragraph 6, which supposedly sets out the overarching task for the expert group. It cannot remain unnoticed that this task is an exact replica of a similar one assigned to expert group B of the Working Group on the Long-term Sustainability of Outer Space Activities, but which it failed to complete fully. Taking into account that even expert group B was unable, for objective reasons, to formulate a clear idea of "information-sharing procedures, ensuring information consistency and information transfer reliability" when considering this issue in connection with the safety of space operations, it would be inexcusably naive to believe that the same goal could be achieved in isolation from safety issues, especially in the absence of any significant arrangements on safety. Understanding information exchanges cannot be a detached reasoning process. It should be realized that the approach proposed by the United States is at variance with the position of expert group B in that the issue of information-sharing has receded to the background and that, ab initio, its discussion within the proposed expert group is not planned at all (only the possibility of such a discussion is allowed for);

(d) Expanding the pool of expertise on issues related to exchanging information on the situation in outer space and its sharing should lead to the formulation of lasting views that would be common to all. Consequently it will be necessary to work out a common understanding of how the accumulated knowledge should be translated into successful political action and normative regulation. It is clear that the appropriate tool for that purpose is the guidelines for the long-term sustainability of outer space activities. Therefore a reasonably extended negotiation process is needed to make it possible to bring together all aspects of the finalization of the guidelines within the basic work cycle;

(e) Expediency requires that a serious examination be made of known international practices and their particular features. The analytical interest of those practices should not extend only to laudable aspects of available practices, but should also include the problems such practices encounter. A complete analysis will be possible if relevant States show critical self-awareness in examining the shortcomings of the international practices they have developed, while all participants in the discussion avoid simple perceptual attitudes with regard to the issues to be discussed. It is questionable whether all information on objects and events in outer space should become proprietary without exception. Quite possibly

reimbursement of costs could be an issue that cannot be totally neglected; reimbursement could be required in cases where there is a need to conduct special types of activities that are not provided for by the routine operating procedures and require the use of technical and analytical resources for collecting, processing and analysing extra information on a given object or event. Thus, it would be useful to think about the criteria to be applied in such cases.

III. Developing and preserving options for establishing a United Nations information platform

The Russian Federation presents a more detailed description of how the platform might work

14. The information platform, as proposed by the Russian Federation for establishment under the auspices of the United Nations, would not only become a driving force helping to increase mutual trust in, and the predictability of, outer space activities, but would also become a tool that could make it technically feasible to compare and assess the compatibility of information on objects and events in outer space obtained from various sources. The platform could allow the implementation of a unified international mechanism for notifying States of planned operations in outer space and any potentially hazardous events that might be expected to occur. At the same time, the Russian Federation is aware of all the difficulties that, for objective and subjective reasons, may arise while developing the idea of such a platform. Nevertheless, the benefits for the international community that may be associated with such a platform would be so significant that they have motivated the Russian Federation to stay loyal to the concept proposed earlier and to work out the details. Annex II to the present working paper contains the views of the Russian Federation on ways to introduce more details into the concept of the design and operation of the platform. The material provided further builds on the approach described earlier by the Russian Federation and reflected in documents A/AC.105/L.290 and A/AC.105/L.293.

15. If States really want to act in outer space in a responsible way, they should not exaggerate the cost or the burden associated with the implementation of this initiative to set up a United Nations information platform. The platform is bound to produce infinitely more opportunities in terms of supplying information and to overcome the weaknesses that hinder and will inevitably continue to hinder the development of cooperation in the field of information in other formats. Estimates show that the establishment of a functional complex such as the platform would not necessitate substantial allocations or human resources.

16. Many delegations in the Subcommittee that would be willing to support the idea of setting up the platform have not yet stated their opinion publicly, for purely political reasons. The delegation of the Russian Federation and the delegations of a number of States keenly and actively supporting the proposal to address the possibility of creating the platform have initiated a group of like-minded delegations expressing readiness to act together. The delegation of the Russian Federation is ready to assist those and any other delegations in their efforts to develop a comprehensive view of how the platform might operate.

17. United Nations General Assembly resolution 70/82 of 9 December 2015 encourages the Office for Outer Space Affairs to conduct capacity-building activities associated with space security and transparency and confidence-building measures in outer space activities, as appropriate, and within the context of the long-term sustainability of outer space activities. Given this mandate from the United Nations General Assembly, it would be perfectly reasonable for the Subcommittee to act on the idea, proposed as early as February 2015, of requesting the Office to examine the possibility of locating the information platform in Vienna and report its findings.

Annex I

Comparative analysis of the two approaches to addressing the issue of sharing information on objects and events in outer space

Type of service	*Interaction with a single provider of monitoring information*	*Interaction within the platform*
1. Ascertainment of the causes of anomalies in the operation of space objects and development of response measures	This type of service is designed for the situation when the operator/owner of a space object informs the space monitoring authority about an anomaly in the operation of the said object. In this case, support in assessing the state of the space object in terms of its orientation and stabilization, integrity, signals emitted, presence of previously unknown objects in its vicinity (including, inter alia, fragments resulting from destruction) may be provided. Such support may help ascertain the causes of the anomaly (on-board equipment failure, probable collision with another space object etc.) and develop appropriate response measures. The operator/owner of the space object notifies the space monitoring authority of the planned measures. Such a scheme of interaction does not seem to address and resolve the issues of informing other space object operators/owners for whom the given situation may create potential threats (dangerous conjunction, collision, radio-frequency interference). If there are any facts or circumstances indicating that in some bilateral practices the issue of effective interaction with third parties is regulated, relevant details would be appreciated during discussions within the Scientific and Technical Subcommittee.	According to the principles of platform organization and functioning proposed by the Russian Federation, it is presumed that the platform mechanism will allow any authorized user of the platform to enter information on an anomaly that occurred in operation of their space object in the platform database with a view to requesting support in obtaining the information on the state and/or the trajectory of that object and to provide notification of potential threats to other objects. As soon as the information on the anomaly is entered, the platform automatically generates a request for support and sends it to the authorized platform users in accordance with the agreed rules. All authorized users will have access to the information received by the platform database upon such request. Any authorized provider may introduce into the platform database the information on planned response measures to address the anomaly which occurred in the operation of the space object.
2. Collision avoidance support including conjunction assessment	This type of service provides for assessment and analysis of the parameters of predicted conjunctions of space objects in an orbit or of a launch vehicle scheduled for launch with space objects in an orbit. With regard to conjunctions of space objects, such service provides support in particular in space object manoeuvre planning and post-manoeuvre analysis. This service is definitely useful. Notwithstanding the above, experts at international specialized forums who represent space object operators and relevant entities specializing in conjunction	If the set of rules for the platform's operation is implemented, users of the platform, regardless of their participation in any bilateral or multilateral agreements on exchanging information on space objects, will have greater opportunities to receive support in prevention of collisions, particularly in conjunction analysis. An incentive for any particular user to submit information on the planned trajectory of its own space object (considering possible manoeuvres) to the platform database will consist in receiving, in turn, warnings of predicted conjunctions of its object with other objects simultaneously from

Type of service	*Interaction with a single provider of monitoring information*	*Interaction within the platform*
	analysis note that information containing possible conjunction analysis provided under such bilateral agreements is not always enough to make a decision on the necessity of an avoidance manoeuvre. The point is that even the most technologically advanced space monitoring systems have objective limitations in terms of coverage of near-Earth outer space areas, number of monitored objects and accuracy of orbital information on the objects. These objective difficulties are aggravated by the fact that the capability of a closed interaction system to verify information is rather limited. Besides, in these circumstances it is impossible to predict dangerous conjunctions with manoeuvring space objects of the third parties which are not participants in any such bilateral agreement and do not provide information on future trajectories of their space objects.	multiple platform users (who possess the technology for calculating and assessing conjunctions of space objects). Thus, fusing various data will make it possible to specify and verify information on conjunctions and, therefore, to considerably improve safety of the user's own objects. In turn, the availability of information on the planned trajectories of manoeuvring space objects will allow all platform users to adequately predict dangerous conjunctions of such objects with all other objects, including those of their own. Besides, the use of the platform's database information will make it possible to resolve conflict situations in cases where the possibility of a dangerous conjunction is identified with regard to two operating objects. Basically, the same capabilities of the platform will be used for predicting and analysing possible conjunctions of launch vehicles with space objects in an orbit in the course of a scheduled launch.
3. De-orbit and re-entry support	This service provides assessments of the predicted time and place of a space object's entry into the atmosphere, on the basis of available measurement information received through monitoring means. Such predictions do not always ensure sufficient accuracy, which substantially depends on the parameters of a space object orbit, technical capabilities and the geographical distribution of monitoring means.	Positive experience gained over the years of re-entry test campaigns led by the Inter-Agency Space Debris Coordination Committee (IADC) can be taken into account within the framework of the platform to further improve the quality of re-entry assessment practice. In this regard, IADC has developed all technologies for joint information processing and predicting space objects' motion as well as interaction procedures. The platform will make it possible to use integral sets of information received from several providers in order to enhance the accuracy of predictions about the time and place of entry into the atmosphere of each potentially dangerous space object (rather than just testing objects such as those used in IADC campaigns), as well as to introduce this good practice on a continuous and more representative basis.
4. Disposal/end-of-life support	In functional terms, this service provides for measures that basically amount to providing support in order to avoid collision, including conjunction analysis.	Considerations set forth in paragraph 2 with regard to the platform's functions regarding procedures for providing support in collision avoidance, including conjunction assessment, are fully applicable in this case. With regard to disposal and end-of-life operations, the platform will be able to offer the additional service of long-term prediction about orbit evolution, which would be provided when planning such operations

Type of service	*Interaction with a single provider of monitoring information*	*Interaction within the platform*
		through a standard algorithm shared by all users and harmonized at the time of the platform's creation. As is known, pursuant to the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space and the IADC Space Debris Mitigation Guidelines, the ballistic lifetime of a space object (in low-Earth orbit region) should be estimated and the fact that the disposal orbit does not intersect the protected area of a geostationary orbit should be verified. Accordingly, the application of the platform's uniform algorithm will ensure effective implementation of the above-mentioned regulatory norms.
5. Electromagnetic interference investigation	Generally, such service (if provided through internationally recognized methods) is useful.	The platform does not provide for such service. Situations involving harmful radio-frequency interference are to be resolved on the basis of rules established by the International Telecommunication Union. At the same time, it is necessary to use all available resources to increase the actual efficiency of the procedures that are to be applied.
6. Launch support, including launch screening (i.e. the process for determining the available launch windows based on conjunction assessment processes) and early orbit determination (i.e. the provision of early orbit determination results upon completion of the launch)	Determining available launch windows in order to prevent possible in-orbit collisions of space objects with a launch vehicle during its insertion is a difficult task (in terms of both methodology and requirements for the information used). It is good that such a far-reaching goal has been put on the agenda. However, it should be acknowledged that the effectiveness of this service directly depends on the identification and analysis of conjunctions with space objects. As indicated above in paragraph 2, fundamentally resolving this problem involves the use of properly generalized and analysed information from different sources. Early orbit determination requires that orbital information is accurate and, most crucially, promptly provided. Such prompt performance combined with accuracy would be best ensured by aggregating information from different space monitoring data providers.	The platform makes it possible to solve the issue of unifying the formats for information provision and information content concerning the trajectory of a scheduled launch in a way that would be acceptable to all users. This solution, in turn, makes it possible to define a uniform process for analysing the trajectory of a scheduled launch by different users of the platform. This creates conditions for the most expeditious and, essentially, an automatic way of determining the available launch windows based on conjunction assessment processes. The platform's mechanism will enable any space object operator/owner that is an authorized user of the platform to make a request within the platform's database for results of the early determination of its space object's orbit. The request is automatically sent to all platform users who have previously indicated in their profile that they are able to provide information on such requests. Thus, information on the actual orbits of insertions of launched space objects, received within the platform will, first, be relevant for the operators and, second, be used for identification and subsequent registration of space objects.

Annex II

Detailed elaboration of the concept of organization of the United Nations information platform

1. Developing a common understanding of the principles underlying the establishment and operation of the platform means considering at least four building blocks:

- Platform functions and mode and principles of its operation;
- Information content, presentation formats and updating procedures;
- Procedures for establishment, maintenance and practical use of the platform;
- Review of existing forms of international information interaction in the light of the possible adoption of positive experience to serve the platform.

Building block 1

Platform functions and mode and principles of its operation

2. Basic functions of the platform could include:

- Receipt of information according to an agreed list from the authorized information providers (hereinafter referred to as "providers") and saving of received information, with its attributes (receipt time, provider, anticipated update interval), in the platform database in a formalized fashion (i.e. according to one of the agreed formats of information presentation) or non-formalized fashion (i.e. free format);
- Preparation and automatic mailing of notifications of the receipt from providers of specific (special) categories of information (on a planned launch, actual launch, potentially dangerous conjunction, break-up in orbit, anticipated uncontrolled entry of a potentially dangerous object into the atmosphere, anticipated controlled entry of a major object into the atmosphere and new objects in outer space); the exhaustive list of information categories would be specified during the phase of detailed platform development;
- Provision to authorized users of information (hereinafter referred to as "users") of online access to the information in the platform database.

3. Auxiliary functions of the platform could include:

- Ensuring international accounting of space launches and space objects in accordance with the 1975 Registration Convention (in particular, maintaining a list of unique identifiers of space launches and space objects) and object identification;
- Automatic reporting on various issues: summary statistics on registered and non-registered objects; status of space objects (e.g. in the context of United Nations General Assembly resolution 62/101); orbital events, actual space launches, termination of existence of objects in orbit, and movements of spacecraft in geostationary orbit during a reference period. An exhaustive list

of reports would be specified during the phase of detailed platform development;

- Automated analysis of information on the trajectory of motion of space objects furnished by various providers;
- Receipt of queries from users regarding extra clarification of the information stored in the platform database and automatic forwarding of such queries to the providers of said information;
- Preparation of an offline version of the United Nations Register of space objects for distribution on information media;
- Database administration.

4. Mode and principles of the platform operation could be presented as follows:

- The platform is realized on the basis of the hardware that exists and should be additionally installed at the United Nations Office at Vienna;
- Information support for the platform (including administration of the database information) could be provided by the Office for Outer Space Affairs;
- The platform should operate in a 24/7 mode;
- The interaction of providers and users with the platform should be carried out using secure data transfer protocols that prevent unauthorized access to the platform functions, and platform database and to the information packages that circulate in the channels of interaction of providers and users with the platform;
- Each connection to the platform should be recorded;
- Receipt of information from a provider should be confirmed through platform software;
- Mailing of notifications via platform channels should be recorded, and the addressees should present acknowledgements of notifications received;
- When received from a provider, the information should be subjected to an entry check against the agreed formats and a check of values of specific parameters against the accepted range;
- The information model underlying the structure of the platform database should allow for multiple values of attributes (as different providers may give different values for the same characteristics of a space object or event);
- Backup of hardware that ensures platform operation (including hot backup of the server of the platform database) and of communication channels should be envisaged in case of technical failures;
- Protocols of information exchanges between the platform and providers/users of information should be implemented with the use of internationally recognized standards for presenting specific types of information (e.g. information on trajectory of motion of objects, information on conjunctions). In the absence of internationally recognized standards for presenting certain types of information, new standards should be developed and implemented;

- Recipients of information should be provided with data on the provider of specific blocks of information, entry time of the information in the database, period of applicability of specific values of attributes or blocks of data, availability of updates of such information and other auxiliary attributes whose composition is to be specified during the phase of detailed platform development;
- Interaction with the platform should be provided in two modes: interactive, i.e. through a user web interface, and automatic, i.e. through interaction between software modules;
- Users working with the platform in an interactive mode should be provided with necessary platform interaction facilities designed with the use of modern approaches to developing web interface applications;
- The user web interface of the platform should be integrated within the single Office for Outer Space Affairs portal;
- The capacity of media for storing the platform database should allow for information to be accumulated over a long period of time (at least several years); the ability to increase data storage capacity without a fundamental change in platform architecture should be provided for;
- Provision should be made for regular backup of the platform database.

Building block 2

Information content, presentation formats and update procedures

5. It is presumed that the platform database should cover all information categories relating to space launches, space objects, in-orbit operations and events in near-Earth space that would be included in the set of guidelines for ensuring the long-term sustainability of outer space activities. This need arises due to the lack of a single international information system for all the categories of information referred to above (as opposed to, for example, information on space weather distributed through specialized web portals). The available disparate sources of such information fail to provide reliable data necessary for States and international organizations to make decisions in particular circumstances. Moreover, media channels often disseminate inaccurate or even distorted data, which ultimately leads to incorrect interpretation of particular events and can even lead to tensions between participants in outer space activities. Thus, the coverage of all the above-mentioned information categories by a single database of the platform should contribute to the successful implementation of the guidelines and to an increase in transparency and confidence in outer space activities.

6. In developing a detailed concept of the platform, certain constraints have been taken into account and functionally resolved in relation to the lack of:

- A single mechanism for international accounting of objects (and, consequently, the possibility of assigning international designators to launches and objects and ensuring unambiguous correspondence between the physical bodies in orbit and registration numbers assigned to space objects on the basis of the information received from States in accordance with the 1975 Registration Convention);

- A single international mechanism for establishing the identity of orbital objects detected by monitoring means of various States and international organizations;
- An international mechanism for collecting orbital information from different sources, comparing it and evaluating the applicability of aggregate information for identifying possible potentially dangerous conjunctions;
- A single international database of events in space (termination of existence of objects in orbit, docking/separation of objects, break-ups);
- A single international database that would make it possible to keep track of records on space objects planned to be launched and actually launched, as well as planned and actually performed space launches.

7. The attributes characterizing the main categories of information are described below:

(a) Information about an upcoming launch of space objects:

- Information provider;
- Date and time of compilation of the information by the provider;
- Date and time of receipt of the information in the platform database;
- Unique identifier of a launch;
- Launch location (launch site, launch facility, launch complex);
- Estimated date and time of the launch (time intervals for different dates);
- Type of launch vehicle;
- Planned composition of space objects which should appear in orbit during the launch: the number of spacecraft, launch vehicle stages and accompanying operational fragments;
- Name of each space object designed to operate in outer space in an independent orbital flight, reference to the State which has jurisdiction and control over each of the objects, as well as contact information for communication with the entities responsible for space object (spacecraft) operations;
- Presence/absence of payloads whose separation from orbital stages of a launch vehicle or upper stages is not provided but which continue operation at the end of the injection programme; name, owner State and contact information in the event of presence of such payloads;
- Parameters of areas of airspace and maritime areas which pose a risk to aeronautics and navigation during the conduct of the operation of launching a launch vehicle, including the areas of the intended return of orbital and/or suborbital stages of the launch vehicle to the atmosphere and their fall to the Earth's surface. (The information is passed to the platform database not less than five days before the planned event, its content and format being in compliance with the existing procedures for providing such information in accordance with annex 15 to the Convention on International Civil Aviation

and the guidelines for the functioning of the World-Wide Navigational Warning Service of the International Maritime Organization.);

- Planned time of conduct of main operations in the process of launching relative to the lift-off time (separation of orbital stages, separation of space objects, on/off switching of engines of stages);
- Planned parameters of the orbit of each space object at the time of separation from a launch vehicle and the expected dispersion of parameter values (as a minimum, the area of near-Earth space where the separation of the object has taken place);
- Planned parameters of the operational orbit or disposal orbit of space objects, if they differ from planned orbital parameters at the time of separation (as a minimum, the area of near-Earth space where an operational orbit is situated, for example, the geostationary area, the area of low orbits, the area of high-apogee elliptical orbits etc.);
- Anticipated date and time of injection of each space object into its operational orbit, if they differ from the planned time of separation of the space object from the launch vehicle.

Comment

Information on an upcoming launch of space objects is entered into the platform database on the basis of official notifications transmitted by providers. A backup option would be to allow for the possibility of updating the database using authenticated information posted on the official websites of the entities conducting the launch of launch vehicles and/or space objects, in cases where the information does not come directly from a related provider for any reason. Each upcoming launch is assigned a unique identifier that makes it possible to associate information on the launch with a posteriori information on the results of the launch. The assigned unique identifier of a launch is communicated to the provider of original information on the launch and that identifier should be further used when updated information on the planned launch or a posteriori information on the results of the launch is transferred to the platform database.

(b) Information on a conducted launch of space objects:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of receipt of information in the platform database;
- Unique identifier of a launch (assigned before or during the input of information if the information on a planned launch was not provided in advance);
- Result of the launch (an orbital launch accompanied by the emergence of new space objects or a failed launch without the injection of any objects into orbit);
- International identification number of an orbital launch (assigned by the platform operator in accordance with the established rules and communicated to the launch information provider);

- Launch location (launch site, launch facility, launch complex);
- Actual date and time of the launch;
- Type of launch vehicle;
- Actual set of space objects placed in orbit in the course of the launch: number of spacecraft, stages of launch vehicle, accompanying operating fragments;
- Names of each of the space objects that separated in the course of the launch and are designed to function in space in independent orbital flight, reference to the State which has jurisdiction and control over each spacecraft and also contact information for entities responsible for space object (spacecraft) operations. If such information was provided prior to the launch, additional or amended information could be provided;
- Names of other space objects that separated in the course of the launch and are performing an independent orbital flight;
- Information on space objects which were planned to be separated but failed to do so and on objects planned to be separated in suspended mode;
- Approximate dimensions and mass; flag indicating ability to conduct intentional changes of trajectory of motion of each new space object having emerged as a result of a launch and independently performing flight in orbit or along the trajectory of escape from the Earth's gravity;
- Additional characteristics of each new space object in accordance with the provisions of United Nations General Assembly resolution 62/101;
- Flag indicating the implementation of measures on passivation for each stage of the launch vehicle and/or upper stage which remained in the orbit as a result of the launch;
- International identification designators of space objects placed in orbit as a result of the launch (assigned by the platform operator in accordance with established rules and communicated to the launch information provider; subsequently, these international designators should be used when submitting to the Secretary-General of the United Nations registration information on objects launched into outer space for entry in the United Nations Register of Objects Launched into Outer Space in accordance with the 1975 Registration Convention);
- Confirmation of ability to control each launched space object (of the establishment of contact between such object and the ground services) or of the establishment of the fact of inability to maintain control (without giving a reason).

Comment

Information on a successful launch of space objects is entered in the platform database on the basis of official notices transmitted by providers. An alternative backup option would be to allow for the possibility of updating the database using authenticated information posted on the official websites of the entities conducting the launches of the launch vehicles and/or space objects in cases where the information does not come directly from the related provider for any reason.

(c) Information on the trajectory of motion of space objects:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of receipt of information in the platform database;
- Identifier of the object (assigned by the platform and communicated to the information provider upon first receipt of the information on that object; subsequently, the provider would use this identifier to transmit the updated information on the trajectory of motion of the object);
- Ephemerides and covariance matrices of errors (describing the trajectory of motion of the space object and represented in standard format) and metadata (describing basic characteristics of transmitted information packet: coordinate system, timescale, data applicability interval, information category — factual, i.e. information acquired through actual measurements or predicted information etc.). (The set of characteristics in this information packet should correspond to the Orbit Ephemeris Message format of the 502.0 Orbit Data Messages international standard of the Consultative Committee.)

Comment

Information on the trajectory of motion of space objects should, as practicable, be updated with periodicity comparable with the time of deterioration of previously provided information on the trajectory of motion of the same object. Considering the provisions of General Assembly resolution 62/101, the providers would have to update the information on predicted trajectory of motion in cases of planned operations to alter the trajectory of motion ("manoeuvres") and on the actual trajectory after conducting such operations.

(d) Information on predicted or actual conjunction of space objects:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of the receipt of information in the platform database;
- Identifier of objects (identifiers which were previously assigned by the platform are to be used);
- Characteristics of conjunction event (in accordance with the international standard 508.0 Conjunction Data Message of the Consultative Committee).

Comment

Information on predicted or actual conjunction of space objects should be, as practicable, transmitted to the platform database within at least three days prior to the conjunction moment with subsequent updating up to the conjunction moment as well as immediately after conjunction.

(e) Information on predicted or actual de-orbiting of a space object from the near-Earth orbit:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of the receipt of information in the platform database;
- Identifier of objects (identifiers which were previously assigned by the platform are to be used);
- Flag indicating the operation on controlled de-orbiting of a space object or uncontrolled re-entry of a space object;
- With regard to controlled de-orbiting of a space object: parameters of areas of airspace and maritime areas that pose a risk for aviation and navigation in the course of the operation for de-orbiting the space object.

Comment

Information on predicted or actual controlled de-orbiting of the space object from near-Earth orbit shall be transmitted to the platform database at least five days prior to the planned event in the format and to the extent specified in the relevant procedures for providing information, pursuant to annex 15 to the Convention on International Civil Aviation and guidelines for the functioning of the World-Wide Navigational Warning Service of the International Maritime Organization. The information on controlled de-orbiting of a space object should be provided by the State (or international intergovernmental organization) that has jurisdiction and control over that space object. The information on mass and dimensions of component elements which might reach the surface of the Earth with high probability can be provided additionally.

- With regard to uncontrolled re-entry of a space object: predicted boundaries of fragment impact area (coordinates of boundary points of predicted impact area and corresponding moments of time) stating the most probable central point (coordinates and corresponding moment of time).

Comment

In cases where the State (or international intergovernmental organization) that has jurisdiction and control over a space object which, according to the prediction, will re-enter in an uncontrolled flight mode is able to track this event, it should provide the above-mentioned information. Notwithstanding the above understanding, States or international organizations that have at their disposal the means of monitoring near-Earth space and predicting the time and area of the termination of the space object orbital existence could provide information on predicted uncontrolled re-entry of the space object. As practicable, such data should be supplemented by actual information on the predicted trajectory of motion of the object.

- Additional information (non-formalized) on hazardous materials within the body of the space object and/or size and mass of the space object’s body elements which might reach the surface of the Earth.

(f) Information on the in-orbit breakup of a space object:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of receipt of information by the platform database;
- Identifier of object (identifiers previously assigned by the platform should be used);
- Assessment of boundaries of the time interval of the breakup of a space object;
- Amount of debris from the fragmented space object detected by monitoring means;
- Assessment of the total number of space objects generated by the breakup, with size distribution;
- Likely cause of the breakup (unintentional collision with another space object; external influence not related to another space object (factors of space weather and/or factors of intentional change in the attributes of space environment); external influence related to another space object; breach (loss) of integrity of a space object as a result of in-orbit operation; explosion of residual propellants; explosion of electric batteries; "cause unknown" may be indicated, where appropriate).

Comment

Information on the in-orbit breakup of a space object can be provided by the State (or international intergovernmental organization) exercising jurisdiction and control over the fragmented object. Irrespective of such understanding, information on the breakup of a space object could be provided by States or international organizations which have near-Earth space monitoring means and capability to establish the fact of a breakup of a space object on the basis of monitoring data analysis. The information should be accompanied, if possible, by information on the trajectory of motion of the broken object (prior to the breakup) and the objects which were identified as debris generated by the breakup.

(g) Information on the planned or conducted in-orbit operation:

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of receipt of information by the platform database;
- Identifier of the object, or object identifiers in cases where the operation involves more than one space object. (Identifiers previously assigned by the platform should be used; for newly generated objects, identifiers assigned by the platform in the process of entering information on new objects should be used);
- Type of operation (in the framework of the platform's information model it is proposed to consider the following types of operations: separation of a space object from another space object; docking of a space object with another space object; mechanical capturing of a space object by another space object;

deployment of a tether system; deployment of structural components substantially changing the ratio of the maximum cross-sectional area of a space object to its mass; transfer of a space object to the graveyard orbit or the orbit with a decreased ballistic lifetime; change in the nominal position in geostationary orbit; change in the nominal position within the orbital structure of the satellite system);

- Boundaries of time interval of the operation;
- Information on motion trajectory of each object engaged in the operation, prior to and after the operation.

Comment

Information on the planned or conducted in-orbit operation should be provided well in advance, if possible, in order to enable other participants in outer space activities to coordinate their actions and ensure safety during their own operations.

(h) Information on the change of status of a space object (cessation or resumption of operation):

- Information provider;
- Date and time of compilation of information by the provider;
- Date and time of receipt of information by the platform database;
- Identifier of the object;
- Date and time of change of status;
- Nature of change of status (cessation of operation; resumption of operation; loss of control over the flight of a space object posing risk of potentially dangerous conjunction with other operational space objects; restoration of control over a space object);
- Reason for change of status (the following possible cases may be considered: on-board equipment failure; unidentified external influence (impact); shutdown of on-board equipment according to the mission and termination of operations with a space object); “cause unknown” may be indicated, where appropriate;
- Indication of passivation of a space object when it ceases to operate (if the cessation of operation is envisaged under the mission).

Comment

Information on the change of status of a space object should be provided without significant delay after the change of status. It is especially important in the event of loss of control over a space object posing a risk of harmful radio-frequency interference to other operational space objects and/or risk of potentially dangerous conjunction with other operational space objects.

(i) Information on a new space object detected by near-Earth space monitoring means:

- Information provider;

- Date and time of compilation of information by the provider;
- Date and time of receipt of information by the platform database;
- Identifier of an object (assigned by the platform when entering information);
- Date and time of the first observation (monitoring) of an object;
- Assumed category of an object (spacecraft; stage of a launch vehicle or booster stage; technological fragment; fragment from the breakup; fragment of unidentified nature; object of unidentified category);
- Information on trajectory of motion;
- Assessment of the average size of an object.

Building block 3

Procedures for the establishment, maintenance and practical use of the platform

8. Efforts to establish, put into operation and subsequently operate the platform should provide for several stages, the timing of which may overlap (in other words — certain types of activities may be performed simultaneously).

(a) Development of a technical project providing for a detailed description of:

- Platform architecture;
- Platform functions;
- Types of processed information;
- Presentation formats and semantic description of data downloaded by users to the platform's database;
- Information data model;
- Requirements for information entry control;
- Procedural requirements for interaction of users with the platform;
- Requirements for the functionality of the user interface of the platform (interactive and software);
- Requirements for administration of the platform database;
- Requirements for ensuring the reliability of information communication and storage;
- Requirements for the structure and characteristics of technical means which are to serve as the basis for the platform;
- Requirements for the means of functional control of the status of the platform hardware;
- Requirements for system-wide software (operational system, database management system, web server etc.).

(b) Development and approval by States and international organizations of the user agreement on the platform, covering, among other things, the following aspects:

- Rules of access to platform information resources;
- Restrictions on the use of data;
- Regulation of the application in relations between the providers and users of information and the United Nations, which is the platform operator, of the principle of a comprehensive cross-waiver of liability and indemnity claims.

(c) Assessment of technical and human resources, available to the United Nations Office at Vienna (and, in particular, the Office for Outer Space Affairs) for the implementation of the technical project of the platform and the subsequent work on the operation of the platform;

(d) Development of protocols for information interaction of the platform with the providers and users of information;

(e) Software and technological implementation of the developed technical project, including, among other things:

- Setting up of a local network for the operation of the platform;
- Installing the necessary system-wide software;
- Information model software realization in the selected environment of the database management system;
- Programming of the interactive and software interfaces for interaction of users with the platform;
- Programming of protocols for information interaction of the platform with the providers and users of information.

Building block 4

Review of existing forms of international information interaction in the light of the possible adoption of positive experience to serve the platform

9. At present, there is a range of information systems, including those created within the United Nations system, which provide users with information products in various fields of space activities as well as related areas of international interaction. In order to establish the platform, it seems appropriate to analyse the existing international mechanisms and procedures for sharing information, including regulations on working with such information systems, models of processing, analysing and interpreting information and other aspects. The expediency of automation of the interaction of the platform with some of the existing sources of information should be addressed. Particular interest may be presented by the following mechanisms and procedures which:

- Maintain the United Nations Register;
- Maintain a space weather information portal created by the World Meteorological Organization;

- Ensure timely and automated notification of areas temporarily closed to aviation and maritime navigation due to space operations in line with annex 15 to the Convention on International Civil Aviation and guidelines defining the functioning of the World-Wide Navigational Warning Service of the International Maritime Organization;
- Maintain the catalogue of asteroids and comets in the Minor Planet Centre of the International Astronomical Union;
- Organize cooperation in the framework of the Inter-Agency Space Debris Coordination Committee in order to ensure early exchange of information during test campaigns on objects which discontinue ballistic life;
- Provide international satellite operators with orbital information on functioning space objects;
- Maintain the Database and Information System for the Characterization of Objects in Space (DISCOS) database operated by the European Space Operations Centre;
- Maintain public archives of data, compiled and provided for public use by researchers from different countries (orbital data; data on objects entering the atmosphere; data on changes in apparent brightness of objects; recorded facts of space object's fragments reaching the Earth's surface; data on space launches, including failed launches etc.).

Matters relating to the expediency of automated platform interaction with some of the existing information sources should be examined.