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English only

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**Committee on the Peaceful  
Uses of Outer Space**  
**Scientific and Technical Subcommittee**  
**Fiftieth session**  
Vienna, 11-22 February 2013  
**Long-term sustainability of outer space activities**

**Preliminary draft report and proposed candidate guidelines  
of expert group B: Space Debris, Space Operations and  
Tools to Support Collaborative Space Situational Awareness**

**I. Introduction**

Expert group B has carried out its work and developed its outputs in accordance with its workplan, contained in A/AC.105/C.1/L.325, and in accordance with the terms of reference and methods of work of the Working Group on the Long-term Sustainability of Outer Space Activities (LTSSA) of the Scientific and Technical Subcommittee (STSC) (A/66/20, Annex II). This conference room paper presents a draft report outline of the expert group B report and candidate best practice guidelines.

**II. Draft report outline**

**Executive Summary**

**1. General**

- Composition of expert group
- Summary method of work for Expert Group B (full method of work as appendix)
- Methodology
- Long-term sustainability of space activities in the context of Expert Group B topics  
(can summarize background discussions in subsequent sections)



- Inputs received and reviewed
- Criteria for development of new best practices guidelines
- Consistency with existing international legal framework for outer space activities, including existing United Nations treaties and principles governing the activities of States in the exploration and use of outer space
- Relationship to current work being done within the Committee on the Peaceful Uses of Outer Space and its Subcommittees, other United Nations intergovernmental bodies, intergovernmental organizations, and other international organizations and bodies
- References (could be appendix)
- Abbreviations and Definitions (could be appendix)

## **2. Space debris**

### **(a) Background**

- Key issues (importance for long-term sustainability)
- Previous work by the STSC

### **(b) Measurements, monitoring and characterization of space debris**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within United Nations and in other bodies)
- Recommended new best practice guideline
  - Gaps in existing framework
  - Justification for new guideline
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups

### **(c) Measures to reduce the creation and proliferation of space debris**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guidelines
  - Gaps in existing framework
  - Justification for new guidelines
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**(d) Technical developments and possibilities regarding space debris removal**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**(e) Controlled and uncontrolled re-entry notifications regarding substantial space objects, and also on the re-entry of space objects with hazardous substances on board**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guideline
  - Gaps in existing framework
  - Justification for new guideline
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**3. Space operations****(a) Background**

- Key issues (importance for long-term sustainability)
- Previous work by the STSC

**(b) Conjunction assessment and collision avoidance processes and procedures**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guidelines
  - Gaps in existing framework
  - Justification for new guidelines
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**(c) Pre-launch and manoeuvre notifications (supporting launch collision avoidance and on-orbit collision avoidance for functional space objects)**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guideline
  - Gaps in existing framework
  - Justification for new guideline
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**(d) Common standards, practices and guidelines**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guideline
  - Gaps in existing framework
  - Justification for new guideline
- Topics for further research
  - Cross-cutting issues for consideration by other LTSSA Expert Groups
  - Proposals to LTSSA Working Group on areas for further consideration by the STSC

**4. Tools to support collaborative space situational awareness**

**(a) Background**

- Key issues (importance for long-term sustainability)
- Previous work by the STSC

**(b) Directories of spacecraft operators, space operations and space situational awareness organizations, and contact information**

- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
- Recommended new best practice guidelines
  - Gaps in existing framework
  - Justification for new guidelines

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- Topics for further research
    - Cross-cutting issues for consideration by other LTSSA Expert Groups
    - Proposals to LTSSA Working Group on areas for further consideration by the STSC
- (c) **Collection, sharing and dissemination of orbital data on functional and non-functional space objects**
- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
  - Recommended new best practice guideline
    - Gaps in existing framework
    - Justification for new guideline
  - Topics for further research
    - Cross-cutting issues for consideration by other LTSSA Expert Groups
    - Proposals to LTSSA Working Group on areas for further consideration by the STSC
- (d) **Storage and exchange of descriptive information on the operational status and characteristics of functional and non-functional space objects, as they pertain to the long-term sustainability of space activities**
- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
  - Recommended new best practice guideline
    - Gaps in existing framework
    - Justification for new guideline
  - Topics for further research
    - Cross-cutting issues for consideration by other LTSSA Expert Groups
    - Proposals to LTSSA Working Group on areas for further consideration by the STSC
- (e) **Information-sharing procedures, ensuring information consistency and information transfer reliability**
- Current practices and operating procedures, technical standards, policies and existing best practice guidelines (both within the United Nations and in other bodies)
  - Topics for further research
    - Cross-cutting issues for consideration by other LTSSA Expert Groups

- o Proposals to LTSSA Working Group on areas for further consideration by the STSC

**5. Closing section**

Summary of recommendations

- (a) **New best practice guidelines**
- (b) **Proposals to LTSSA Working Group on areas for further consideration by the STSC**

### **III. Candidate best practice guidelines**

Member States and international organizations should voluntarily take measures, through national mechanisms, or through their own applicable mechanisms, to ensure that the following guidelines are implemented, to the greatest extent feasible:

**1. Space Debris**

**1a. Measurements, monitoring and characterization of the space debris population**

*Share space debris monitoring information to support conjunction assessment*

Publicly-available information on space objects should be consulted and supplemented with other relevant information to facilitate monitoring and characterization of the space debris population.

*(New proposed guideline)*

**1b. Measures to reduce the creation and proliferation of space debris**

*(i) Limit debris released during normal operations*

Space systems should be designed not to release debris during normal operations. If this is not feasible, the effect of any release of debris on the outer space environment should be minimized. In addition, practices widely recognized as hazardous, but with better alternatives, should be explicitly discouraged.

*(UN COPUOS Space Debris Mitigation Guideline 1)*

*(ii) Minimize the potential for break-ups during operational phases*

Spacecraft and launch vehicle orbital stages should be designed to avoid failure modes which may lead to accidental break-ups. In cases where a condition leading to such a failure is detected, disposal and passivation measures should be planned and executed to avoid break-ups.

*(UN COPUOS Space Debris Mitigation Guideline 2)*

*(iii) Minimize potential for post-mission break-ups resulting from stored energy*

In order to limit the risk to other spacecraft and launch vehicle orbital stages from accidental break-ups, all on-board sources of stored energy should be depleted or

made safe when they are no longer required for mission operations or post-mission disposal.

*(UN COPUOS Space Debris Mitigation Guideline 5)*

- (iv) *Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit (LEO) region after the end of their mission*

Spacecraft and launch vehicle orbital stages that have terminated their operational phases in orbits that pass through the LEO region should be removed from orbit in a controlled fashion. If this is not possible, they should be disposed of in orbits that avoid their long-term presence in the LEO region.

*(UN COPUOS Space Debris Mitigation Guideline 6, partial)*

- (v) *Limit the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous Earth orbit (GEO) region after the end of their mission*

Spacecraft and launch vehicle orbital stages that have terminated their operational phases in orbits that pass through the GEO region should be left in orbits that avoid their long-term interference with the GEO region.

*(UN COPUOS Space Debris Mitigation Guideline 7)*

**1c. Technical developments and possibilities regarding space debris removal**

*No guideline proposed*

**1d. Controlled and uncontrolled re-entry notifications regarding substantial space objects, and also on the re-entry of space objects with hazardous substances on board**

*Limit the risk to people and property following controlled and uncontrolled spacecraft and launch vehicle orbital stage re-entries*

When making determinations regarding potential solutions for removing objects from LEO, due consideration should be given to ensuring that debris that survives to reach the surface of the Earth does not pose an undue risk to people or property, including through environmental pollution caused by hazardous substances. In cases of a controlled high-risk re-entry event in which the re-entering space object or residual material from the re-entering space object would likely cause potential significant damage or radioactive contamination, provide appropriate notices to mariners and airmen regarding projected impact areas and times. In cases of an uncontrolled high-risk re-entry event in which the re-entering space object or residual material from the re-entering space object would likely cause potential significant damage or radioactive contamination, provide appropriate notices to nations where impact of hazardous debris is possible.

*(Expanded United Nations COPUOS Space Debris Mitigation Guideline 6)*

## **2. Space Operations**

### **2a. Conjunction assessment and collision avoidance processes and procedures**

*Limit the probability of accidental collision in orbit*

In developing the design and mission profile of spacecraft and launch vehicle stages, the probability of accidental collision with known objects during the system's launch phase and orbital lifetime should be estimated and limited. If available orbital data indicate a potential collision, adjustment of the launch time or an on-orbit avoidance manoeuvre should be considered.

*(UN COPUOS Space Debris Mitigation Guideline 3)*

### **2b. Pre-launch and manoeuvre notifications (supporting launch collision avoidance and on-orbit collision avoidance for functional space objects)**

- (i) *Provide pre-launch notifications for launch collision avoidance with functional space objects*

*No guideline proposed*

- (ii) *Provide manoeuvre notifications for on-orbit collision avoidance for functional space objects*

*Candidate guideline under development*

### **2c. Common standards, practices and guidelines**

*Avoid intentional destruction and other harmful activities*

Recognizing that an increased risk of collision could pose a threat to space operations, the intentional destruction of any on-orbit spacecraft and launch vehicle orbital stages or other harmful activities that generate long-lived debris should be avoided. When intentional break-ups are necessary, they should be conducted at sufficiently low altitudes to limit the orbital lifetime of resulting fragments.

*(UN COPUOS Space Debris Mitigation Guideline 4)*

## **3. Tools to Support Collaborative Space Situational Awareness**

### **3a. Directories of spacecraft operators, space operations and space situational awareness organizations, and contact information**

*Provide other States with contact information for spacecraft operations and space situational awareness organizations*

Direct contact between spacecraft operations and space situational awareness centres can enable timely coordination to reduce the probability of, and facilitate effective responses to orbital collisions, orbital break-ups, or other events which might increase the probability of accidental collision or which might cause other potentially harmful interference with other space activities. Provide contact information for governmental and, as appropriate, national non-governmental entities with responsibilities for spacecraft operations and space situational awareness.

*(New proposed guideline)*



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**3b. Collection, sharing and dissemination of orbital data on functional and non-functional space objects**

*Use a standard format when sharing orbital information on space objects*

When sharing orbital information on space objects, operators should use a common, internationally recognized standard format to enable collaboration and information exchange. Facilitating greater shared knowledge of the current and predicted location of space objects would enable timely prediction and prevention of potential collisions or other potentially harmful interference with other space activities.

*(New proposed guideline)*

**3c. Storage and exchange of descriptive information on the operational status and characteristics of functional and non-functional space objects, as they pertain to the long-term sustainability of space activities**

*Provide registration information on space objects*

Provide registration information on space objects in accordance with the Convention on Registration of Objects Launched into Outer Space and consider furnishing enhanced registration information on the operational status changes as recommended in United Nations General Assembly Resolution 62/101 (Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space object). States should provide this registration information as soon as practicable to the Secretary-General of the United Nations to assist in the identification of space objects and to contribute to the peaceful exploration and use of outer space.

*(New proposed guideline)*

**3d. Information-sharing procedures, ensuring information consistency and information transfer reliability**

*No guideline proposed*

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