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Long-term sustainability of outer space activities

**Voluntary implementation of the Guidelines for the
Long-term Sustainability of Outer Space Activities: Report
by Italy**

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* [A/AC.105/C.1/L.405](#).



Voluntary Implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities

Report by Italy to the WG on LTS of the 60th Session of the COPUOS STSC

Italy was fully engaged in the process leading to the adoption of the Preamble and 21 Guidelines for the long-term sustainability of outer space activities in 2019. It is pleased now to submit a Report on voluntary implementation of the Guidelines for consideration by the Committee on the Peaceful Uses of Outer Space's Scientific and Technical Subcommittee at its 60th session. Following the years of excellent work performed in developing the LTS Guidelines, it is time now for them to be practically applied and tested. Italy joined consensus on encouraging States and international intergovernmental organizations to voluntarily take measures to ensure that the Guidelines are implemented to the greatest extent feasible and practicable. Italy believes that member states should focus their efforts on not just implementing the Guidelines, but sharing the approaches, practices and lessons learnt in doing so. By compiling and reviewing the experiences and lessons learned of all member states, intergovernmental organisations and industry in the implementation of the Guidelines, there will be a much better understanding of the practical steps that can be taken by the Committee.

A. Policy and regulatory framework for space activities

A.1 Adopt, revise and amend, as necessary, national regulatory frameworks for outer space activities

Italy is party to four of the United Nations space treaties, namely OST, ARRA, LIAB and REG, and has implemented them, according to its constitutional practice, through orders of execution in form of law or decree depending on their content. Subsequent internal legislation has regulated specific related issues, such as the liability for damages to third-parties, the registration of space objects, and the operation of satellite telecommunication systems. Italy considers necessary to fulfil in a sustainable way its obligations under the UN treaties as State responsible for national activities in outer space and as launching State, especially those requesting the authorization and supervision of the space activities carried out by private Italian operators. In this perspective, the development of a more comprehensive legal framework is under the attention of the competent authorities, also in view of the adoption

of legal provisions aimed at enhancing the long-term sustainability of outer space activities.

A.2 Consider a number of elements when developing, revising or amending, as necessary, national regulatory frameworks for outer space activities

The National Security Strategy for Space, adopted by the Interministerial Committee for Space Policies (COMINT) in 2019, considers the promotion of sustainability, safety and security of outer space activities as a strategic objective and foresees among the lines of action the adoption of a national legislation concerning private and commercial space activities. The intention is to use this instrument as an opportunity to ensure the application of international norms and practices that enhance the long-term sustainability of outer space activities, also in line with the recommendations contained in resolution 68/74 of the General Assembly on national legislation relevant to the peaceful exploration and use of outer space. Regarding the potential development of its national space sector, Italy considers appropriate, at the normative level, the method of adaptive and progressive governance.

In this respect, the following elements are considered: Italian planning for the SDGs contained in the national strategy for sustainable development; compliance with the international technical standards published by the International Organization for Standardization (ISO) and the Consultative Committee for Space Data Systems. In addition, in view of the increase of space activities carried out by universities and private operators, which shows a specific focus on small satellites, the Italian Space Agency (ASI) is considering the definition of ad hoc national guidelines aiming at raising awareness among those operators by providing them with information, useful advice and recommendations including on the topic of outer space sustainability. More in general, for the purpose of evaluating the implementation of the Guidelines at national level, the ASI, in collaboration with the Ministry of Foreign Affairs and International Cooperation, has started to map and identify the specific practices implemented in compliance with the Guidelines.

A.3 Supervise national space activities

Implementation is executed through the assessment process carried out at the technical level to ensure that institutional space missions meet key safety and sustainability criteria. Furthermore, the on-going process *de lege ferenda* will include the development of new assessment criteria to ensure the supervision and the long-term sustainability of private space activities.

A.4 Ensure the equitable, rational and efficient use of the radio frequency spectrum and the various orbital regions used by satellites

Italy is a member State of the International Telecommunications Union (ITU). The allocation of radio frequencies is internally covered by the regulatory framework on licenses for the operation of telecommunications systems, having administrative nature, and applied under the supervision of the National Authority for Telecommunications (NAC) (2003 Code for electronic communications and relevant decisions of the NAC). The conditions for the general authorisations on satellite services are oriented to enhance openness and sustainability. Italy shares the requirements indicated by the Resolution on “Sustainability of radio spectrum and associated satellite orbit resources used by space services” adopted by the Conference of Plenipotentiaries of the ITU in 2022.

A.5 Enhance the practice of registering space objects

Italy has always registered its space objects launched into outer space, firstly on a voluntary basis in accordance with the 1961 UNGA Resolution 1721 B (XVI), and then, after the adhesion to the REG Convention in 2005, following the prescriptions of that legally binding treaty and the domestic implementing legislation. The ASI is entrusted with maintaining the National Registry and collecting all related information, as well as some additional matters relevant for the sustainability of space activities, such as notification of Italian registered space objects no longer in Earth orbit. In addition, the regulation adopted by the ASI takes in duly consideration UNGA Resolution 62/101 on Recommendations on enhancing the practice of States in registering space objects.

B. Safety of space operations

B.1 Provide updated contact information and share information on space objects and orbital events

Italy practically implements this Guideline partly through improvement to its access to capabilities for Space Situational Awareness (SSA) and Space Surveillance and Tracking (SST). This includes the development of new tools and capabilities to make better use of the data currently available. The scientific, institutional and industrial national space community has developed important know-how in SSA. Italy carries on an important role also in the European framework of cooperation developing infrastructures and delivering SST services for the EU, while being engaged in ESA towards Near Earth Objects and Space Weather activities. This capability has been developed

thanks to a series of infrastructures made available partly by the Defense (telescopes and radars) and the Italian National Institute for Astrophysics, INAF (Sardinia Radio telescope, Northern Cross) and partly by the ASI (MLRO, SPADE). In the coming years, thanks to the development funded by the ASI of the FlyEye telescope, Italy will equip itself with a dedicated control center and national infrastructures.

B.2 Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects

An international consolidated practice recommends that States should share orbital information on space objects and notify in a timely manner and to the greatest extent practicable, potentially affected States of scheduled manoeuvres. As a principle, Italy notifies the competent organizations of other States any scheduled manoeuvre in the event of close approach when a modification of trajectory is needed to perform a collision avoidance.

B.3 Promote the collection, sharing and dissemination of space debris monitoring information

The Italian scientific and technological communities bear a long-standing expertise in the fields of hazards posed by man-made space objects and orbital debris, as shown by the advances in the realization and deployment of the FlyEye telescopes devoted to surveying the space debris population; the participation to the EUSST programme aimed at reaching a high level of autonomy in monitoring the space debris population. A network of FlyEye telescopes is able to observe an extremely wide area of the visible sky every night, thus it can be extremely effective in observing the MEO (Medium Earth Orbit) region, where navigation constellations reside, and the region above 1500 km of altitude. To this purpose, in 2022, ASI has started the procurement of 4 FlyEye telescopes for space debris observations.

B.4 Perform conjunction assessment during all orbital phases of controlled flight

Italy implements this Guideline by exchanging orbital data of national manoeuvrable satellites with the competent entities of other States in case of an event of close approach. This data exchange practices have been consolidated after the conclusion of specific space situational awareness agreements either at national public bodies level, or at the operators level. Italy considers the importance of performing conjunction assessment during all orbital phases of controlled flight to ensure the safety of space operations. Furthermore, Italy participates in the EUSST Partnership for the delivery of

Collision Avoidance (CA), Re-entry Analysis (RE) and Fragmentation Analysis (FG) services. The Italian Operations Centre (OC) provides data and information for the RE and FG services by using national sensors, including MIRLO, SPADE, PdM MiTe, Birales, RANTIGA, MFDR-MR, MFDR-LR. Italy supports ESA efforts to facilitate collaboration among Member States by promoting interoperability and standardisation with regard to conjunction assessments.

B.5 Develop practical approaches for pre-launch conjunction assessment

Italy does not launch space objects from its territory, yet considers pre-launch conjunction assessment capability pivotal for avoiding collisions during the high-risk launching phase. In view of contributing to measures concerning the spread of ballistic missiles, Italy has subscribed the Hague Code of Conduct against Ballistic Missile Proliferation (HCoC), whose members voluntarily commit politically to provide pre-launch notifications (PLNs) on ballistic missile and space vehicle launches (SLVs).

B.6 Share operational space weather data and forecasts

The Italian scientific community contributes to the advancement of our knowledge of the properties and evolution of the Space Weather phenomena with observational campaigns from space and from the ground. Furthermore, the Italian Space Agency participated several times in space missions related to Space Weather. The Heliospheric Space Weather Center project, carried on in synergy between the Aerospace Logistics Technology Engineering Company (ALTEC S.p.A.) and the Astrophysical Observatory of Torino of the Italian National Institute for Astrophysics (INAF) is aimed at providing space weather medium and short-term forecast, by combining remote-sensing and in situ open data with novel data analysis technologies. With regard to the issue of climate change and the environmental challenges of the future, Italy contributes to the Destination Earth (DestinE) initiative, which aims to develop a highly accurate digital model of the Earth to monitor and predict the interaction between natural phenomena and human activities. As part of the Green Deal and the European Commission's Digital Strategy, DestinE will contribute to achieving the objectives of the dual transition, green and digital.

B.7 Develop space weather models and tools and collect established practices on the mitigation of space weather effects

Italy participates in the European Space Weather System development activities carried out in the framework of the ESA Space Safety Programme (S2P). Italy is also a member State of the World Meteorological Organization.

B.8 Design and operation of space objects regardless of their physical and operational characteristics

The University of Padova is part of the European Consortium aimed at developing a way to deorbit space debris called E.T.PACK, along with Spanish and German Universities.

B.9 Take measures to address risks associated with the uncontrolled re-entry of space objects

Italy considers of paramount importance for the sustainability of outer space activities the development and implementation of measures to exchange information and notification, in a timely manner and to the greatest extent practicable, of predicted high-risk re-entry events in which the re-entry space objects or residual material from the re-entering space object potentially could cause significant damage or radioactive contamination. In that regard, it has developed a set of best practice to implement such Guideline. On the occasion of the uncontrolled re-entry of the Italian BeppoSax spacecraft, occurred on 30 April 2002, a specific national coordination unit was set up, composed of civil and military bodies, coordinated by the Italian Civil Protection Department, to continuously monitor and predict the re-entry event. In particular, Italy provided regularly updated provisions of time passage over the populated territory and related geographical band of fragments falls to the United Nations and, through the local Italian Embassies, to the States potentially affected by the re-entry. Besides, Italy contributes with national sensors to the Re-entry Analysis service provided by the EUSST Partnership. Within the framework of the latter, Italy oversees the provision of re-entry and fragmentation services. In 2022, this operational activity has resulted into closely following the most significant uncontrolled re-entry (in coordination with the Italian Department for Civil Protection) and in-orbit fragmentation events.

B.10 Observe measures of precaution when using sources of laser beams passing through outer space

The implementation of this Guideline relies on the activities of the Matera Laser Ranging Observatory (MLRO) a satellite and lunar laser telemetry system located at the Space Geodesy Center (CGS) of the ASI in Matera. It shows itself as a cassegrain reflecting telescope with a diameter of 1.5 m, but its function is to determine the exact orbits of artificial satellites and derive high-precision geodetic measurements. To do this it emits laser beams, with a frequency of about ten pulses per second and each lasting a few picoseconds.

C. International cooperation, capacity-building and awareness

C.1 Promote and facilitate international cooperation in support of the long-term sustainability of outer space activities

To achieve this Italy actively participates in various international and national fora performing research into the space environment. Italy recognizes the paramount importance that international cooperation provides as a basis for all States to develop and strengthen their capacity to undertake and/or derive benefits from space activities. Furthermore, international cooperation on scientific and technical projects between both spacefaring and non-spacefaring nations can contribute to capacity and confidence-building.

Italy implements this measure both at governmental and agency level. In particular, the ASI operates in the framework of the bilateral and multilateral relations and space cooperation agreements, and coordinates the Italian participation in European and international space projects. At bilateral level, Italy is party to several space intergovernmental framework agreements for the exploration and use of outer space activities, while the ASI is currently party to more than sixty bilateral agreements signed with different international partners, that are space faring countries as well as emerging or developing countries. At multilateral level, Italy implements this Guideline actively participating in different multilateral intergovernmental regional and international organizations, such as the ESA, EUMETSAT, EUTELSAT, the UNCOPUOS, the Inter-Agency Space Debris Coordination Committee (IADC) and groups such as the Group of Earth Observation (GEO), the Committee on Earth Observation Satellites (CEOS), the International Committee on Global Navigation Satellite Systems (ICG), the International Space Exploration Coordination Group (ISECG) and other technical fora.

C.2 Share experience related to the long-term sustainability of outer space activities and develop new procedures, as appropriate, for information exchange

Italy is deeply engaged in international and regional initiatives, international academic committees and other entities, NGOs and industries, addressing long-term sustainability issues and allowing the exchange of information, expertise and experience relating to the long-term sustainability of outer space activities between the members of these entities. It actively participates in the Committees of the International Astronautical Federation (IAF), which for over 70 years has provided a valued forum for space agency, industry, non-profit, academic, and student leaders to confront and debate the challenges facing our collective future in the reaches far above planet Earth. It is now seeking to influence conversations around the sustainability of the space environment. Securing orbits, spacecraft, frequencies, and physical resources is critical to the

future viability of space exploration. Norms and improved understanding of safe practices in space will allow actors to promulgate new applications to help study, track, understand, and protect planet Earth for future generations. Italy strongly supports this methodology and the maximum use of multistakeholder dialogue for enhancing the exchange of information.

C.3 Promote and support capacity-building

Italy has been promoting and supporting capacity-building in the space sector for emerging space countries. In the framework of the Italy-Kenya space cooperation, the ASI concluded a Framework Agreement with Sapienza University of Rome following which the former undertakes to engage the latter on issues of common interest, including higher education programmes for Kenyan universities. Since 2019, the Sapienza University and the Kenya Space Agency (KSA) carry out capacity building activities through the Outer Space Law for International Cooperation and Sustainable Development Project (OSL Project), which focusses on the legal and policy instruments on sustainability of space activities, including the 21 Guidelines on LTS. Activities include training courses, webinars and joint participation in International conferences, such as IAF's Glec 2022 in Quito, Ecuador.

C.4 Raise awareness of space activities

Italy implements this Guideline by publishing on the websites of the competent agencies the main documents on the national space policy and strategies, and the ASI's Plans of Activities (PTA) that contain the detailed actions planned for a three-annual period. This measure is also implemented through international cooperation programs, at governmental and agency level, where the bilateral meetings with different partners are the occasion to exchange relevant information regarding national space policies and space application projects. Furthermore, Italy promotes several multilateral initiatives that contribute to raise awareness of space activities and its benefit for the society, as well of the needs to preserve the space environment for future generations. The ASI/IAF International Space Forum at Ministerial Level initiative aims to encourage a global and local discussion and debate on the necessity of promoting a greater involvement of the Accademia and research centres into space activities. It contributes to the flowing of space knowledge also in regions of the world where space activities are not yet developed or its benefits are not yet known enough.

Furthermore, Italy is a strong supporter of the Space Economy Leaders Meeting initiative, launched by the Saudi Space Commission in 2020, in the margins of the G20, which aims to raise the awareness of the importance of the space economy for the global economy and to promote the inclusion of such topic in the agendas of the G20. In 2021, Italy, through ASI, organised the second edition of the initiative, in the margins of the G20 under the Italian Presidency,

and promoted the adoption of a final recommendation in support of the implementation of the LTS guidelines. The Indonesian space agency has organized the 2022 edition and the Indian space agency is already preparing the next year edition.

D. Scientific and technical research and development

D.1 Promote and support research into and the development of ways to support sustainable exploration and use of outer space

Italy implements this Guideline through continued support on the development of new technology, both through national programmes and projects overseen by the ESA and the EU. Through both avenues there are opportunities to fund technology that seek to minimise the environmental impact of space assets throughout their lifecycle. Italy also supports the national scientific community in the development of appropriate metrics to assess the impact of missions on the space environment.

D.2 Investigate and consider new measures to manage the space debris population in the long term

We may refer to the ASI activities in the field of space debris mitigation as falling into three different domains: a) IADC. ASI has been one of the founding member of the International Space Debris Coordination Committee and as such it actively participates to the definition of guidelines and of the regulatory aspects of the space activities, to the technical working groups devoted to studying the most relevant topics involved into monitoring the space debris and to the sharing of assets and data when joint observational campaigns are organized; b) EUSST. ASI is the national entity representing the Italian involvement into the EUSST for providing services in the three major domains of space debris monitoring: collision avoidance, re-entry and fragmentation. This implies developing an operational capability at national level and the sharing of data and assets within the consortium; c) Research. ASI supports research initiatives either directly through the funding of national programs or through fostering the participation of academic or research entities to EU or international cooperative programs on space debris. ASI applies the European Code of Conduct for Space Debris Mitigation, which it has signed on 14 February 2005, through its standard contract provisions, which gives to the European Code of Conduct a mandatory character. After 2005, the European Code of Conduct for Space Debris Mitigation is an applicable document to all phases of all space missions.