EU Non-Proliferation Consortium
The European network of independent non-proliferation think tanks

Non-Proliferation Papers
No. 51 July 2016

THE SECURITY OF SPACE ACTIVITIES

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I. ARE ACTIVITIES IN NEAR-EARTH OUTER SPACE SECURE AND SUSTAINABLE IN THE LONG TERM?

A worrying situation

The safety and security of space activities in earth orbit and their sustainability over the long term have become a matter of concern. Indeed, while security issues in outer space were mostly handled at the bilateral level between the Soviet Union and the United States during the cold war, most actors in outer space, including states, regional space organizations and commercial satellite operators, realize today that our use of outer space since 1957 has been rather careless of its long-term sustainability, probably because outer space appears infinite and unlimited. The situation is very similar to that in the 19th and 20th centuries with respect to shipping and exploiting the oceans' resources: there was a wilful ignorance of the negative impact of pollution and a general blindness to the long-term effects of overfishing.

This paper addresses the three aspects of the safety, security and long-term sustainability of space activities, as they cannot be analysed separately. Any process at the national, regional or international level that would lead to an increase in the security of space activities would also affect their safety and long-term sustainability. It is therefore wiser to assess them together.

The massive increase in the number of actors, both government and private, operating systems in outer space is a result of the successful use of space systems to explore the solar system, for scientific research more generally and more importantly to deliver services to society. These include telecommunications, navigation, time synchronization, weather forecasting and observation of the environment, among others. It is fair to say that this proliferation of actors will probably

SUMMARY

The secure and sustainable use of outer space has become a concern. More than 60 nations and regional governmental organizations operate satellites in earth orbit and a large number of private companies operate commercial satellite systems. The number of systems deployed in low earth orbit and on the geostationary ring creates new risks of interference and of physical collision.

There is also the risk of outer space becoming a battlefield. While it seems that the deployment of weapons in outer space has not taken place, ground-based weapons can be used against spacecraft in low orbits. Also, technologies for the jamming and blinding of satellites are becoming easily accessible.

Several initiatives have emerged in recent years to establish the 'rules of the road' in outer space. Russia and China tabled a draft treaty on the prevention of the placement of weapons in outer space at the Conference on Disarmament in 2008 and, the same year, the European Union (EU) proposed an International Code of Conduct for outer space. In 2013 the United Nations General Assembly unanimously endorsed the report from the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space that it had set up in 2010.

Despite this flurry of activity, disagreements persist and no concrete measures have been agreed so far. If it wants to be a significant actor, the EU needs to step up its efforts to reinforce its voice in international discussions on the security of outer space activities.

ABOUT THE AUTHOR

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require a stronger and updated international regulatory framework in order to guarantee every operator fair, safe and sustainable access to outer space.

The rapid increase in the amount of orbital debris is a major concern and although measures have recently been adopted at the international level to limit its future growth, the result of this self-imposed discipline will not be seen for decades. In terms of the security of space activities, the major risk is the potential use of weapons in outer space—the risk that outer space will become another battlefield. This risk was very high during the cold war but both the Soviet Union and the USA decided that self-restraint was a better option. Today, the availability of a more diversified suite of weapons, some of which are very discreet, combined with the global political situation and the high risk of conflicts at a regional level involving some major space powers—which have become more dependent on their own space systems—increase the vulnerability of space-based systems.

In addition, there is the complex issue of managing the finite radio-electric spectrum available, and the orbital slots allocated to geostationary satellite operators. This increasingly challenging task is managed by the International Telecommunication Union (ITU), which is based in Geneva. However, the ITU operates under United Nations rules—by consensus for most of its activities—and lacks any real enforcement power.

Finally, there is the potential effect of solar storms (or space weather) on the operation of orbital systems. This risk is not new, however, and is independent of the number of functional space objects in orbit.

These are the main factors that must be considered when discussing our ability to continue to operate safely and without interference in earth orbit today, tomorrow and in the long term.

II. SOME NUMBERS

In order to appreciate the situation, it is useful to take stock of some numbers.

1. 12 states have demonstrated their own space launch capability, but only 6 of these conduct regular launch operations: China, France (Arianespace), India, Japan, Russia and the USA. Collectively, they conduct 80–90 launches per year (86 in 2015, of which 81 were successful). However, more and more launches deliver multiple spacecraft to orbit, sometimes up to 12 small satellites at a time.

2. There were 5165 successful space launches between 1957 and the end of 2015.

3. About 22 000 objects are being tracked by the US Space Surveillance Network and a high proportion (17 255) have been catalogued, that is, they have been identified and tracked over long periods with enough certainty. However, among this large number of objects, only 23 per cent are functional or non-functional spacecraft. Of the remaining 77 per cent, 11.5 per cent are spent upper stage rocket bodies, 11.5 per cent other mission-related objects and 54 per cent fragments—an increase from 41 per cent before China's anti-satellite (ASAT) test of 11 January 2007.[1] The tracked objects are typically larger than 10 centimetres in size (1 metre in geostationary orbit at 36 000 km altitude), but a much larger amount of smaller debris, several hundred thousand items between 1 cm and 10 cm, are also orbiting the earth. These smaller debris are not catalogued individually and much more difficult to track, but can still cause significant damage to operational spacecraft because of the high relative velocity of objects in Low Earth Orbits (LEOs).

4. More than 60 states and regional governmental organizations operate satellites in earth orbit, and an increasing number of private companies operate commercial satellite systems, either in Geostationary Earth Orbit (GEO), where most telecommunications satellites are located, or in LEO, which are widely used for meteorological and remote sensing satellites and also for telecommunications satellite constellations. There are currently about 1200 operational satellites (i.e. functional satellites delivering a service), of which 450 are operating in the GEO ring. Most of the rest are either in LEO or in the Medium Earth Orbits (MEOs) used by the Global Positioning System (GPS) and other global navigation satellite constellations.

III. THE MAIN CAUSES OF CONCERN

Increased crowding in LEO as well as in the region around the geostationary ring means that safety of operation without interference, which used to be a non-issue, is more difficult to ensure and requires more attention, including possible new measures to be developed and adopted by the international community.

One additional challenge is to manage orbital and radio spectrum resources in order to limit the risk of

[1] NASA, *Orbital Debris Quarterly News*, vol. 20, no. 1–2 (Apr. 2016).

interference, while maximizing the use of this precious resource. It is highly likely that more stringent rules will have to be adopted by the ITU, which will also need to agree on enforcement mechanisms.

The other challenge is the proliferation of space debris on and around the most widely used orbits. This proliferation must be stopped, and solutions found to the significant threat that debris poses in some LEO altitude/inclination combinations. For example, the voluntary destruction by China of its Fengyun-1 satellite in January 2007 using a ground-based missile created about 30 000 pieces of debris, 3500 of which are larger than 10 cm, in and around the sun-synchronous orbit. More than 2800 were still tracked and catalogued by the US Space Surveillance Network as of the end of 2015. Similarly, more than 1500 pieces of debris from the accidental collision between Iridium 33 and Cosmos 2251 in February 2009 are currently in orbit inclined at 80 degrees over the equator.[2]

The Inter Agency Debris Coordination Committee (IADC), which published its recommendations in 2002 as the IADC Space Debris Mitigation Guidelines, is the prime driver on this issue and is to be commended for its excellent work.[3] The IADC brings together national space agencies from 12 countries plus a regional space agency, the European Space Agency.[4]

The IADC consists of a Steering Group and four specific Working Groups (WGs), covering measurement (WG1), the environment and databases (WG2), protection (WG3) and mitigation (WG4). The primary purposes of the IADC are to exchange information on space debris research activities between member space agencies, to facilitate opportunities for cooperation on space debris research, to review the progress of ongoing cooperative activities and to identify debris mitigation options.[5]

[2] NASA (note 1).

[3] Inter Agency Debris Coordination Committee (IADC), Space Debris Mitigation Guidelines, IADC 02-01 (revised 2007), <www.iadc-online.org>.

[4] The 12 space agencies and countries are: Agenzia Spaziale Italiana (ASI), Italy; the Centre National d'Etudes Spatiales (CNES), France; the China National Space Administration (CNSA), China; the Canadian Space Agency (CSA), Canada; the German Aerospace Centre (DLR), Germany; the Indian Space Research Organization (ISRO), India; the Japanese Aerospace Exploration Agency (JAXA), Japan; the Korea Aerospace Research Institute (KARI), South Korea; the National Aeronautics and Space Administration (NASA), United States; the Russian Federal Space Agency (ROSCOSMOS), Russian Federation; the State Space Agency of Ukraine (SSAU), Ukraine; and the UK Space Agency, United Kingdom.

[5] IADC, Terms of reference for the Inter Agency Space Debris Coordination Committee, IADC-93-01 (rev. 11.3), 2 Apr. 2015.

The IADC completed a major study on the stability of the future LEO environment in 2013, which confirmed the instability of the current LEO debris population. It also confirmed that compliance with mitigation measures, such as the 25-year rule—whereby spacecraft in LEO are to re-enter the earth's atmosphere in less than 25 years—is the first line of defence against an increase in orbital debris.

The risk of outer space becoming a battlefield is of a different nature. It seems probable that the deployment of weapons in outer space has not taken place, but it is well known that there is no clear definition of what a weapon in outer space is. Objects orbiting in LEO travel at 7–8 kilometres/second and two such objects would present a very high relative velocity in the order of 10–15 km/s. This means that any spacecraft with some degree of manoeuvrability could be used as a weapon simply by being directed at another spacecraft. In addition, weapons do not need to be based in outer space to present a threat to orbiting operational satellites. Ground-based weapons can be used, as the 2007 Chinese ASAT test against a spacecraft in LEO demonstrated. If ground-based kinetic energy weapons were used, the additional orbital debris cloud that would result from such actions would jeopardize the secure use of near-earth outer space for a very long time.

Non-kinetic energy weapons, capable of interfering with operational spacecraft by jamming their communications with ground control or blinding their detectors, are already available and have been tested on several occasions. Even without destroying a spacecraft, these 'soft' weapons also present a threat to safe and secure operations in outer space.

For example, as part of its Ballistic Missile Defense programme, the USA has developed powerful ground-based and airborne radar and high-energy lasers that could easily be adapted for use against space objects. Any state that has reached a reasonable technological level would be capable of acquiring some capacity in this field. The deployment of such weapons requires a parallel high quality space surveillance capability to be able to monitor space objects and estimate the position of the target satellite with a sufficient degree of accuracy. Less powerful lasers can also be used to temporarily blind reconnaissance satellites in LEO, thereby preventing the collection of intelligence data over a state's territory.

It appears that China, Russia and the USA are testing various satellite configurations carrying

electromagnetic transmitters or low power lasers, capable of manoeuvring close to target satellites in order to neutralize them. The jamming of radio-electric uplinks and downlinks is the easiest threatening action that can be used by less technologically advanced nations. It is regularly used in certain parts of the world to jam broadcasting satellites carrying radio or television programmes that displease the local regime. The ITU has been asked to handle a number of complaints from telecommunications satellite operators but lacks the required enforcement mechanisms to resolve such issues.

A more sophisticated threat is the potential takeover of a satellite by a third party, be it a terrorist organization or another state. This requires access to codes and the bypassing of existing cyber protections, which would probably require assistance from personnel infiltrated inside the satellite operator's organization. However, the risk cannot be ignored.

Another category of threat is to the ground-based facilities associated with a satellite system, such as control centres or telemetry download receiving stations. These threats are comparable to any other critical facility on the ground, such as a power station or a major telecommunications node. There are physical protections in place but protection against cyberattacks on such facilities also requires as high a degree of attention.

IV. INTERNATIONAL INITIATIVES TO ENSURE THE SAFETY AND SUSTAINABILITY OF SPACE ACTIVITIES

The issue of the safety and sustainability of operations in outer space has been addressed by a number of international governmental and non-governmental organizations. In addition to the IADC, other international bodies have addressed the debris issue, such as the International Academy of Astronautics (IAA), which published a report on space traffic management in 2006 and is planning to publish an update of this study in 2016, and the International Association for the Advancement of Space Safety (IAASS), which published *An ICAO for Space?* in 2007.[6]

The space debris work of the IADC and the subsequent adoption of its Space Debris Mitigation Guidelines in 2007 by the UN Committee on the Peaceful Uses of Outer Space (COPUOS) provide a good model of how the international community can make progress towards a regime on sustainable space operations.[7]

The development of the debris mitigation guidelines was very much a bottom-up process. It started with a detailed assessment of the situation by technical experts from the IADC agencies, was complemented by many tests and simulations, and continued with technical discussions of possible mitigation measures and finally the development of a consensual basis for orbital debris mitigation guidelines based on robust technical grounds. The first version of the IADC Debris Mitigation Guidelines, published in 2002, formed the basis of the discussion within the COPUOS Scientific and Technical Sub-Committee (STSC) when it decided to take up the issue in 2003. The advantage of such a bottom-up, technically robust approach is that the recommendations that emerge are agreed by all parties, which makes it difficult to reopen and thus disrupt the debate at the political level.

In addition, the continuing work of the IADC provides a means to constantly monitor the evolution of the orbital debris situation, regularly review the adequacy of the mitigation guidelines and update them if required. The IADC agencies are also exploring ways to go beyond debris mitigation and studying possible remediation measures. The annual reporting of IADC activities at the February sessions of the STSC in Vienna allows all those member states not represented in the IADC but that participate in COPUOS to be regularly updated on progress.

This positive assessment of the model of the IADC's work and the subsequent STSC debate on ways to mitigate the growth of space debris and the threat this represents to safe operations in earth orbit led the author to float the concept of an STSC WG dedicated to developing 'rules of the road for space traffic'. This idea was first presented at a workshop in Paris on 15–16 May 2006, 'Collective Security in Space: European Perspectives', organized by the Space Policy Institute of George Washington University.[8]

[6] International Academy of Astronautics (IAA), *Cosmic Study on Space Traffic Management* (IAA: Paris, 2006); and International Association for the Advancement of Space Safety (IAASS), *An ICAO for Space?* (IAAS: Noordwijk, 2007).

[7] As endorsed by United Nations, General Assembly, Resolution 62/217 of 21 Dec. 2007.

[8] Brachet, G., 'Collective security in space: a key factor for sustainable long-term use of space', Workshop report, *Collective Security in Space: European Perspectives* (Space Policy Institute, George Washington University: Washington, DC, Jan. 2007), pp. 1–16.

During his term as Chair of COPUOS, the author subsequently raised the issue of the long-term sustainability of outer space activities in a paper presented to member state delegations at the plenary session of COPUOS in June 2007: 'Future role and activities of the UN COPUOS'.[9]

This proposal, and the new impetus that it would provide to COPUOS if it were accepted, led the UN Secretary-General, through the Office for Disarmament Affairs, to invite the Chair of COPUOS to brief the delegations at the First Committee of the General Assembly. The First Committee oversees disarmament issues and is distinct from the Fourth Committee, where COPUOS presents its annual report. This presentation took place in New York on 22 October 2007, at a time when the space community worldwide was celebrating the 50th anniversary of the launch of the first artificial satellite, Sputnik. It reviewed the past achievements of COPUOS and focused on the adoption of the COPUOS Space Debris Mitigation Guidelines at the plenary session in June. It stressed the usefulness of a bottom-up approach to achieving a consensus on possible 'rules of behaviour' in outer space, based on sound technical assessment of the issues and recommended solutions.

Following the introduction of the issue in 2007, the initial intention was that the French delegation to COPUOS would table a formal proposal to include the topic of the long-term sustainability of space activities as a new agenda item at the next plenary session of the Committee in June 2008. If endorsed by consensus among all delegations, this topic would have become an official agenda item of COPUOS in 2009. However, consultations with other delegations that had expressed strong support for this initiative, including the US delegation, showed that it would have been premature to table such a proposal in 2008.

Indeed, the debate that took place at the 51st plenary session of COPUOS in June 2008 confirmed that many delegations, perhaps a little wary of what was behind the concept of the 'long-term sustainability of space activities', were not ready to consider the inclusion of this topic as a new agenda item. In particular, some delegations from emerging space nations were suspicious that this initiative was a hidden attempt by established space-faring nations to restrict their access to outer space.

As a consequence, it was felt preferable to postpone a formal proposal for this new agenda item until 2009. However, despite this delay, awareness had been raised and the importance of this issue was recognized by keen observers such as Theresa Hitchens, then Director of the UN Institute for Disarmament Research (UNIDIR), who published an insightful editorial on the outcome of the 51st session.[10]

In parallel with the briefing of COPUOS delegations, the Canadian Ambassador to the Conference on Disarmament (CD) in Geneva, Marius Grinius, coordinator of informal meetings on the Prevention of an Arms Race in Outer Space (PAROS) agenda item, invited the author in his capacity as Chair of COPUOS to brief the CD delegations on COPUOS activities. The presentation, which took place on 21 February 2008, highlighted the adoption in 2007 of the Space Debris Mitigation Guidelines and included an outline of the initiative on the long-term sustainability of space activities. It is interesting to note that the proposal by Russia and China for a 'Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, and of the Threat or Use of Force Against Outer Space Objects' (PPWT) had been formally tabled at the CD by the Russian Minister of Foreign Affairs, Sergei Lavrov, on 12 February.[11] Coincidently, the presentation took place one day after the USA had used a ship-based missile to destroy a derelict USA 193 spacecraft, which had been orbiting at a low altitude. This low altitude meant that the orbital debris generated by the destruction re-entered the earth's atmosphere within weeks.

A presentation on the 'Long-term sustainability of space activities' initiative was also made at the annual UNIDIR conference on space security, 'Security in Space: The Next Generation' in Geneva on 31 March and 1 April 2008.[12]

In February 2009, an informal consultation meeting in Vienna of the delegations attending the 46th session of the STSC was informed of the progress made on preparing a formal submission of the proposed new agenda item to the plenary session of COPUOS in June 2009.

[9] A/AC.105/L268, 10 May 2007, section D.

[10] Hitchens. T., 'COPUOS wades into the next great space debate', The Bulletin, 26 June 2008, <www.thebulletin.org>.

[11] Proposal by the Russian Federation and the People's Republic of China for a 'Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, and of the Threat or Use of Force Against Outer Space Objects', 12 Feb. 2008, CD/1839.

[12] Brachet, G., 'Long-term sustainability of space activities', Presentation at the UNIDIR conference on space security, UNIDIR 2008/14, pp. 121–23.

At the 52nd session of COPUOS in June 2009, the French delegation formally proposed the topic of the 'long-term sustainability of outer space activities' as a new agenda item for COPUOS in 2010. COPUOS agreed to include the topic as a new agenda item of its STSC from 2010. The STSC then decided to set up a formal WG to address the issue, as it had done in 2003 for the space debris issue. Dr Peter Martinez (South Africa) was selected as Chair of this new, dedicated WG, and its first meeting took place in conjunction with the 53rd session of COPUOS in Vienna in June 2010.

The COPUOS WG continued its work until 2015, relying on four expert groups set up to examine the various aspects of the long-term sustainability of space activities, and preparing a number of proposed guidelines. Unfortunately, at the 53rd session of the STSC in February 2016, the delegation from Russia blocked further progress by the WG. No consensus could be found on what steps should be taken to avoid wasting six years of work. However, a special informal session of the WG is planned in Vienna in June 2016, just before the 59th session of the COPUOS plenary session.

V. THE EU PROPOSAL FOR AN INTERNATIONAL CODE OF CONDUCT FOR OUTER SPACE ACTIVITIES

The COPUOS initiative described above did not focus on space security per se, because COPUOS addresses the peaceful uses of outer space. The security of space activities falls under the mandate of the CD, which meets in Geneva. Unfortunately, there has been little progress at the CD on the PAROS agenda item, largely because the CD has failed to agree an overall work plan. Faced with this lack of progress on the security of outer space, the ambassadors to the CD of the European Union (EU) member states suggested in 2007 that the EU take the initiative, outside of the CD framework, to elaborate and propose to the international community of space-faring nations a 'code of conduct' for outer space activities. The elaboration of the draft code was taken up by a subgroup of the European Council and a first version of the EU draft for an International Code of Conduct (ICOC) was approved by the Council in December 2008 and then widely circulated.

Bilateral consultations with many space-faring nations were conducted by the Council of the European Union in 2009–2010, leading to the publication of a new version of the ICOC in September 2010. A first open-ended multilateral consultation meeting took place in Vienna on 5 June 2012, where an updated version of the draft ICOC was presented by the newly established European External Action Service. A second multilateral forum took place in Kiev on 15–16 May 2013. This led to yet another draft version in September 2013, which was presented and discussed at a third multilateral forum in Bangkok in November 2013. A further open-ended consultation meeting took place in Luxembourg in July 2014.

The next step was to start a formal negotiation on the text of the ICOC, which was planned to take place at UN headquarters in New York on 27–31 July 2015. However, negotiations on the text did not really take place during this session as several delegations objected either to certain aspects of its contents or to the process followed by the EU in developing the draft. On the latter question of process, it is fair to say that many states, such as India, had expressed their reservation as early as 2011.[13]

Thus, after more than eight years, the EU initiative seems to be in the doldrums. It is useful to try to understand what went wrong with the whole process. An interesting analysis was published Lucia Marta in December 2015.[14] The paper identified a number of difficulties encountered by the EU in promoting the ICOC, one of them being the feeling by many emerging states that the process was not genuinely inclusive. According to Marta: 'Even though the EU engaged in consultations with more than 90 countries through Open-Ended Consultation Meetings, the core of the text was already drafted, the "identity" footprint already established. This gave the impression to some countries of facing a fait accompli.'

In addition, many countries expressed the view that the whole EU initiative should have been placed under the umbrella of the UN, a framework that the EU excluded from the beginning, probably out of fear that the process would be slowed down by UN procedures and processes. While this might be a real problem with any UN-sanctioned process, in this particular case it is a fact that promoting an ICOC outside the UN framework proved to counterproductive.

[13] Rajagopalan, R. P., 'Debate on Space Code of Conduct: an Indian perspective', Observer Research Foundation (ORF) Occasional Paper no. 26 (Oct. 2011).

[14] Marta, L., 'Code of Conduct on Space Activities: unsolved critiques and the question of its identity', Fondation pour la Recherche Stratégique (FRS), Note FRS 26/2015, 17 Dec. 2015.

If the EU wants to pursue the promotion of an ICOC on outer space activities, it is clear that a new approach will be needed, based on a better understanding of the negative perceptions of emerging nations and building on the positive statement on the usefulness of such a code included in the 2013 report of the Group of Governmental Experts (GGE) on Transparency and Confidence-Building Measures (TCBMs) in Outer Space.

VI. RUSSIA AND CHINA'S PROPOSAL FOR A TREATY ON THE PREVENTION OF THE PLACEMENT OF WEAPONS IN OUTER SPACE

Since the beginning of the century, China and Russia have been active at the CD in promoting their approach to the outer space security issue—their proposed PPWT, which would forbid the deployment of weapons in outer space.[15] According to the Russian and Chinese supporting statements, such a treaty would reinforce Article IV of the 1967 Outer Space Treaty, which only forbids the deployment of weapons of mass destruction in outer space. A first version of the proposed PPWT was tabled by the Russian delegation at the CD in February 2008. It received only a lukewarm response, but also some highly negative reactions.

From the start, the proposal was strongly opposed by the USA, particularly the Administration of President George W. Bush, which expressed its opposition to any normative attempt in international law that would tie US hands in the area of space security in its US Space Policy published in 2006. More specifically, the USA and many European states expressed strong reservations about the proposed treaty because it did not directly address the threat posed to space-based objects from ground-based ASAT missiles. The USA was also quick to point out that the proposed PPWT did not contain a verification clause. EU member states were unfortunately unable to agree a single, coordinated response to the Russia–China initiative, but did comment on the draft text.

A revised version of the proposed PPWT was tabled by Russia and China at the CD on 10 June 2014.[16] This version contained some marginal corrections but still did not address the issue of ground-based anti-satellite weapons. The international community is clearly not ready to support such a draft, but Russia and China can be expected to continue to push for a PPWT if only to neutralize other international attempts to adopt measures that would increase security in outer space, such as the EU proposal for an ICOC.

VII. THE UN GROUP OF GOVERNMENTAL EXPERTS

Every year since 1990, the First Committee of the General Assembly has prepared and submitted to the General Assembly a draft resolution on TCBMs in outer space activities. In its resolution 44/55 B of 4 December 1990, the General Assembly requested that the UN Secretary-General, with assistance of a GGE, carry out a study on the application of confidence-building measures in outer space. The first report of the GGE on TCBMs in outer space activities was presented to the General Assembly at its 48th session on 15 October 1993.[17] However, the USA expressed reservations about some aspects of the report and this effort did not go any further.[18]

In 2010, initiated by Russia, a new request to the Secretary-General to set up a GGE to conduct a study on outer space TCBMs was included in General Assembly Resolution 65/68 on TCBMs in outer space activities.[19] For the first time in many years, the USA agreed to support the resolution and it was adopted unanimously.

The GGE was formally set up at the beginning of 2012, with representatives from 15 countries: Brazil, Chile, China, France, Italy, Kazakhstan, South Korea, Nigeria, Romania, Russia (Chair), South Africa, Sri Lanka, Ukraine, the United Kingdom and the USA. It held its inaugural meeting in New York on 23–27 July 2012 and two working meetings in 2013, one in Geneva on 1–5 April and the other in New York on 8–12 July. Under the chairmanship of Victor Vasiliev, then Deputy Chief of the Russian Permanent Mission to the UN and the CD in Geneva, the GGE worked efficiently and was able to finalize its report, which was adopted by consensus at the New York meeting. It was submitted

[15] CD/1839.
[16] CD/1985.
[17] United Nations, General Assembly, Prevention of an Arms Race in Outer Space, Study on the application of confidence-building measures in outer space. Report by the Secretary-General, A/48/305 and Corr.1, 15 Oct. 1993.
[18] United Nations, General Assembly, Letter dated 31 August 1993 from the Permanent representative of the United States of America to the United Nations addressed to the Secretary-General, A/48/553, 26 Oct. 1993.
[19] United Nations, General Assembly, Resolution 65/68 on Transparency and Confidence Building Measures (TCBMs) in outer space activities, A/Res/65/68, 8 Dec. 2010.

for endorsement to the First Committee of the General Assembly in September 2013.[20] The GGE report was then endorsed unanimously by the General Assembly in its Resolution 68/50 adopted in December 2013.[21]

It is worth noting some of the recommendations that appear in the GGE report. For instance, on consultative mechanisms:

> 57. Timely and routine consultations through bilateral and multilateral diplomatic exchanges and other government-to-government mechanisms including bilateral, military-to-military, scientific, and other channels can contribute to preventing mishaps, misperceptions and mistrust. They may also be useful in:
> a. Clarifying information regarding exploration and use of space, including for national security purposes;
> b. Clarifying information provided on space research and space applications programmes;
> c. Clarifying ambiguous situations;
> d. Discussing the implementation of agreed transparency and confidence-building measures in outer space activities;
> e. Discussing the modalities and appropriate international mechanisms to address practical aspects of outer space uses;
> f. Preventing or minimizing potential risks of physical damage or harmful interference.
>
> 58. States are encouraged to consider using existing consultative mechanisms, for example, those provided for in article IX of the Outer Space Treaty of 1967 and in the relevant provisions of the ITU Constitution and Radio Regulations.

In its conclusions and recommendations:

> 69. The Group endorses efforts to pursue political commitments, for example, in the form of unilateral declarations, bilateral commitments or a multilateral code of conduct to encourage responsible actions in, and the peaceful use of, outer space. The Group concludes that voluntary political measures can form the basis for considerations of concepts and proposals for legally binding obligations.

Clearly, while not directly quoting the EU's proposed ICOC for outer space activities, the GGE report recognizes the value of such an approach as a step towards more transparency and more international confidence in the conduct of space activities. The fact that the GGE report was adopted by consensus among its experts and was later unanimously endorsed by the First Committee and by the General Assembly indicates strong support from the international community for the direction of travel.

VIII. CONCLUSIONS

There are many threats to the safe, secure and sustainable use of outer space. As more nations and non-governmental organizations deploy space systems, the threats increase—particularly those arising from the proliferation of space debris. Whether these originate from accidental explosions of aging spacecraft or launcher upper stages, collisions between satellites in LEO or the voluntary destruction of an active spacecraft, the threats exist and will not disappear in the short to medium term.

The various international initiatives described above—within COPUOS; by the EU, on an ICOC for outer space activities; by Russia and China, through their proposed PPWT at the CD; and the recent work of the GGE on outer space TCBMs—illustrate the serious concern that both space-faring nations and non-space-faring nations have for the future safety and sustainability of the use of outer space for government-sponsored as well as commercial applications.

This concern was recently expressed in clear terms by the foreign ministers of the Group of Seven (G7) countries at their meeting in Hiroshima on 10–11 April 2016:

> Outer space activities have immense potential for the social, economic, scientific and technological development of all states, and for tackling global issues. We remain concerned about the development of anti-satellite capabilities. We are committed to enhancing the long-term safety, security, sustainability and stability of the space

[20] United Nations, General Assembly, Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, A/68/189, 29 July 2013.

[21] United Nations, General Assembly, Resolution on Transparency and Confidence-Building in Outer Space Activities, A/Res/68/50, 10 Dec. 2013.

environment, to increasing transparency in space activities, and to strengthening norms of responsible behaviour for all outer space activities.

It remains an open question how to convince the new actors in space-related activities, commercial entities as well as emerging space-faring nations, that their best interests lie in abiding by the recommendations and guidelines that will emanate from the bodies and organizations mentioned above. The answer to this critical question lies in the ability of the more established space-faring nations to include the new space actors in the elaboration of such guidelines, and later in the development of international conventions that should formalize the obligations resulting from them.

In this respect, because of its increased involvement in space affairs, including in the security dimension of space activities, the EU could take new initiatives and play a more visible role, provided that it coordinates fully with its more advanced member states and with its international partners. One area where the EU could rapidly play a much stronger role is in space surveillance and tracking. This is an area where the EU is almost blind, although some of its member states do have significant capabilities. Better coordination among EU member states and a well-structured mechanism for the exchange of space surveillance and tracking data are a prerequisite for improving the EU's ability to assess the space situation and protect its own space assets. Some progress has recently been made in this area, but with limited funding support.[22] Clearly, the EU needs to step up its efforts in this area. Acquiring a significant capacity in space surveillance would allow the EU to become a credible interlocutor with the other major actors in space security: Russia and the USA. In addition, one positive consequence of the greater visibility of the EU in space surveillance and tracking would be a more positive perception among the international community that the EU has legitimacy in promoting diplomatic initiatives such as an ICOC or similar arrangements aimed at improving the prospects for a safe, secure and sustainable outer space environment.

[22] Decision no. 541/2014/EU of 16 April 2014 of the European Parliament and the Council establishing a Framework for Space Surveillance and Tracking Support, Official Journal of the European Communities, L158, 27 May 2014, pp. 227–34.

ABBREVIATIONS

ASAT	Anti-satellite
CD	Conference on Disarmament
COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
EU	European Union
GEO	Geostationary Earth Orbit
GGE	Group of Governmental Experts
GPS	Global Positioning System
IADC	Inter Agency Debris Coordination Committee
ICOC	International Code of Conduct
ITU	International Telecommunication Union
LEO	Low Earth Orbit
MEO	Medium Earth Orbit
PPWT	Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, and of the Threat or Use of Force Against Outer Space Objects
STSC	Scientific and Technical Sub-Committee
TCBM	Transparency and Confidence-Building Measure
UNIDIR	United Nations Institute for Disarmament Research
WG	Working Group

This document has been produced with the financial assistance of the European Union. The contents are the sole responsibility of the EU Non-Proliferation Consortium and can under no circumstances be regarded as reflecting the position of the European Union.

A EUROPEAN NETWORK

In July 2010 the Council of the European Union decided to create a network bringing together foreign policy institutions and research centres from across the EU to encourage political and security-related dialogue and the long-term discussion of measures to combat the proliferation of weapons of mass destruction (WMD) and their delivery systems.

STRUCTURE

The EU Non-Proliferation Consortium is managed jointly by four institutes entrusted with the project, in close cooperation with the representative of the High Representative of the Union for Foreign Affairs and Security Policy. The four institutes are the Fondation pour la recherche stratégique (FRS) in Paris, the Peace Research Institute in Frankfurt (PRIF), the International Institute for Strategic Studies (IISS) in London, and Stockholm International Peace Research Institute (SIPRI). The Consortium began its work in January 2011 and forms the core of a wider network of European non-proliferation think tanks and research centres which will be closely associated with the activities of the Consortium.

MISSION

The main aim of the network of independent non-proliferation think tanks is to encourage discussion of measures to combat the proliferation of weapons of mass destruction and their delivery systems within civil society, particularly among experts, researchers and academics. The scope of activities shall also cover issues related to conventional weapons. The fruits of the network discussions can be submitted in the form of reports and recommendations to the responsible officials within the European Union.

It is expected that this network will support EU action to counter proliferation. To that end, the network can also establish cooperation with specialized institutions and research centres in third countries, in particular in those with which the EU is conducting specific non-proliferation dialogues.

http://www.nonproliferation.eu

EU NON-PROLIFERATION CONSORTIUM

The European network of independent non-proliferation think tanks

FONDATION pour la RECHERCHE STRATÉGIQUE

FOUNDATION FOR STRATEGIC RESEARCH

FRS is an independent research centre and the leading French think tank on defence and security issues. Its team of experts in a variety of fields contributes to the strategic debate in France and abroad, and provides unique expertise across the board of defence and security studies.
http://www.frstrategie.org

PRIF Peace Research Institute Frankfurt — HSFK Hessische Stiftung Friedens- und Konfliktforschung

PEACE RESEARCH INSTITUTE IN FRANKFURT

PRIF is the largest as well as the oldest peace research institute in Germany. PRIF's work is directed towards carrying out research on peace and conflict, with a special emphasis on issues of arms control, non-proliferation and disarmament.
http://www.hsfk.de

IISS

INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES

IISS is an independent centre for research, information and debate on the problems of conflict, however caused, that have, or potentially have, an important military content. It aims to provide the best possible analysis on strategic trends and to facilitate contacts.
http://www.iiss.org/

sipri

STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

SIPRI is an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. Established in 1966, SIPRI provides data, analysis and recommendations, based on open sources, to policymakers, researchers, media and the interested public.
http://www.sipri.org/