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# REGIONAL PERSPECTIVES ON NORMS OF BEHAVIOUR FOR OUTER SPACE ACTIVITIES

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# Regional Perspectives on Norms of Behaviour for Outer Space Activities

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# INTRODUCTION

The importance of outer space continues to grow exponentially around the world. As space activities increase and more States becoming spacefaring, or increase their reliance on space services, developing necessary mechanisms for State-to-State interaction on space topics has become an increasing focus of the international community.

For many years, UNIDIR efforts have been concentrated on supporting dialogue and discussion on developing the next phases of mechanisms for building an effective space security regime; one that can meet the needs of international community in future interactions on civil, commercial and international security related space issues.

To this end, as part of UNIDIR's "Facilitating the Process for the Development of an International Code of Conduct for Outer Space Activities" project, UNIDIR developed a series of analytical papers and carried out a series of regional meetings focused on the development of norms of behaviour for outer space activities.

Over 150 governmental and non-governmental participants attended UNIDIR's regional seminars with representation from over 50 countries. This level of engagement demonstrates the growing commitment of governments around the world to make progress on developing norms of behaviour that can contribute to the development of a stable, resilient, comprehensive space security regime. This also underlines the importance of inclusive fora where all space actors are engaged.

This publication is a compendium of six papers and four seminar reports which provide both analytical thinking and a snapshot of the views and opinions of a wide swathe of space actors—established and emerging, current and future.

We would like to thank the European Union for their financial support of this project and the governments of Ethiopia, Japan, Kazakhstan, Malaysia, Mexico, and in the context of the ASEAN Regional Forum, Australia and Viet Nam, for their hosting and/or support.

UNIDIR will continue to support the international community in all aspects of international dialogue on building agreement on norms of behaviour for outer space activities, including discussions working towards an international code of conduct and other non-legally binding and legally binding initiatives.

We hope you find these documents a useful contribution to your thinking and we look forward to continuing to cooperate with all those with space equities in the future.

Ben Baseley-Walker
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# NORMS OF BEHAVIOUR: A POSSIBLE OPTION TO MAINTAIN THE GROWTH OF ASIA–PACIFIC SPACE ACTIVITIES

## INTRODUCTION

In recent years, the Asia–Pacific region has emerged as one of the fastest growing markets for space-based services, becoming the second largest market for fixed satellite services (used for telephone and television broadcast signals), second only to North America.[1] The Futron Space Competitiveness Index ranked four Asian-Pacific states among the top 10 leaders in global space activities.[2] Whether it be the launching of satellites—as in the case of China, India, Japan, and, very recently, the Democratic People's Republic of Korea—or the innovative use of hosted payloads[3] to acquire low-cost telecommunication services—as in the case of the Australian Defense Force's telecommunication payload on board the Intelsat 22 satellite[4]—states across this region are availing themselves of the transformative benefits of space-based services.

As end-user technology, such as smart phones and navigation devices, becomes increasingly accessible to the Asia–Pacific population, it is expected that the region will overtake other regions of the world in the next few years in its demand for space-based services.[5] The infrastructure that supports these services will, necessarily, have to be adapted to accommodate this significant surge in users. This infrastructure will play a critical role in supporting Asia–Pacific growth and development in the economic, social, and technological sectors. However, as Asia-Pacific states become increasingly dependent on space-based services, their vulnerability to threats in outer space increases.

Policymakers and key stakeholders, at the national and the international level, have taken note of the emerging threats in outer space and are seeking a variety of ostensibly complementary solutions in various fora, such as the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and the Conference on Disarmament (CD), to mitigate or prevent conflict in the space domain. One approach that has emerged is the establishment of norms of behaviour for outer space activities. Such norms would act as voluntary "rules of the road", providing actors with an understanding of the acceptable parameters for responsible space activities. Such understandings would preserve and enhance stability in outer space. In the particular case of the Asia–Pacific region, norms of behaviour could work towards assuring that space-based services can contribute to sustaining the economic development of the most highly populated region of the world.

## RISKS TO SUSTAINABILITY IN OUTER SPACE

There are more than one thousand satellites in outer space, operated by over 60 states and entities.[6] With increasingly cheaper solutions for space-based needs, such as nano-satellites and hosted payloads, it is clear that there will be significantly more orbital traffic in coming years. This will increase the potential for collisions and interference between satellites; however, the

1 Wei L., "Trends and prospects of FSS capacity supply and demand in Asia-Pacific", APSCC Newsletter, vol. 18, no. 3, 2012, p. 4.

2 *Futron's 2011 Space Competitiveness Index*, Futron Corporation, 2010, p. 8. It should be noted that Europe is counted as a single entity. The Space Competitiveness Index provides annual statistical benchmarks, analysis, and business intelligence on national space activities.

3 A hosted payload is a module carried on board a satellite but operating independently of the main spacecraft.

4 J. Foust, "An opening door for hosted payloads", *The Space Review*, 29 October 2012.

5 P. Galace, "Strong demand driving the Asia-Pacific satellite market", Satellite Markets and Research, 4 June 2012.

6 See the Union of Concerned Scientists Satellite Database at www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/ucs-satellite-database.html/.

greatest threat to space security will likely come from all the man-made objects that cannot be controlled, including dead satellites, fragments of old rockets, and other types of space debris.[7] Space-situational awareness systems presently track more than 21,000 pieces of debris larger than 10cm; the number of pieces between 1cm and 10cm is perhaps 450,000.[8] Added to this are millions of fragments too small to track. It is estimated that the amount of space debris in low Earth orbit has increased by 50 per cent in the last five years alone.[9] The rate at which debris is increasing means that the risk of collision of space assets is increasing rapidly and will present a growing threat to all existing and future assets in space.[10]

Along with advances in civil and commercial space-based services, technology has also emerged that could be used to interfere with the functions of a satellite (such as signal jamming)[11] or outright destroy it (by kinetic or physical means).[12] Both of these capabilities are destabilizing factors that would, should they become prevalent, greatly reduce the reliability of space-based services. However, within the present international legal frameworks, the rules regarding the use of such technologies are unclear.

Space security risks are of particular concern in that, unlike most other domains, the actions of any single actor can have significant consequences for the activities of others. As a result, there is a demonstrable need for states to engage in multilateral dialogue in order to find cooperative international solutions for mitigating these challenges.

## NON-LEGALLY BINDING INSTRUMENTS: A MORE FLEXIBLE APPROACH

No significant steps have been made towards the adoption of new public space law treaties within the United Nations for over three decades.[13] Similarly, the CD, the single multilateral disarmament negotiating forum of the international community, has found it difficult to make progress on issues regarding outer space for several years.[14] As a result of the lack of progress on legally binding instruments, combined with a sense of urgency on the part of the international community to address stability and sustainability in outer space, alternatives are being sought by policymakers, in particular non-legally binding tools and frameworks that could "help establish norms for responsible space-faring nations in the near term … [while] a space treaty could take many years to negotiate, and decades to enter into force".[15] As

7 See C. Mathieu, EU Relations Office, European Space Agency, "Space debris: an on-going challenge for all space actors", presented at the UNIDIR conference The Role of Norms of Behaviour for African Space Activities, Addis Ababa, 7–8 March 2013, available at http://unidir.org/files/medias/pdfs/space-debris-an-on-going-challenge-for-all-space-actors-charlotte-mathieu-eng-0-436.pdf/; and J. Robinson, "TCBMs in support of space safety and sustainability", presented at the European Space Policy Institute conference 2012 Space Security Index Launch in Europe, 29 November 2012, Brussels, available at http://swfound.org/media/96606/2012_SSI_Jana%20Robinson.pdf/.

8 NASA Orbital Debris Program Office, "Orbital debris frequently asked questions", March 2012, http://orbitaldebris.jsc.nasa.gov/faqs.html#3/.

9 S. Cruddas, "ESA plans to clear up space junk", Sen, 3 October 2012, www.sen.com/news/esa-plans-to-clear-up-space-junk.html/.

10 S. Kibe, "Removing space debris: the urgent need to clean up Earth's orbital environment", Japan Aerospace Exploration Agency, www.jaxa.jp/article/interview/vol67/index_e.html.

11 "Satellite interference", Holman Fenwick Willan LLP, 2012, www.hfw.com/__data/assets/pdf_file/0016/18052/HFW-and-ID-Article-Satellite-Interference-A4-4pp-February-2012.pdf/.

12 S.A. Kaiser, "Why states should sign the Code of Conduct for Outer Space Activities", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, pp. 91–92; see also M. Kleiman and S. McNeil, "Red lines in outer space", *The Space Review*, 5 March 2012.

13 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 57. A commercial space law treaty has recently been adopted, the Protocol to the Convention on International Interests in Mobile Equipment on Matters specific to Space Assets, though it has not yet entered into force.

14 T. Caughley, *Breaking the Ice in the Conference on Disarmament: A Wrap-Up*, UNIDIR, 2011.

15 M. Krepon, "Origins of and rationale for a space code of conduct", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, p. 31.

the fastest growing region in terms of space activities, the Asia-Pacific states should play a significant role in discussions on ways to develop such norms of behaviour.

Non-legally binding tools and frameworks are often useful in that they provide a level of flexibility not possible with binding treaties.[16] As has been seen with norms of behaviour that have developed in other domains, rules of the road can be amended with relative ease as circumstances change. This allows various options to be tested before more formal agreements are sought. Furthermore, non-binding tools can be used as a mechanism for harmonizing national laws and practices, allowing states to move towards adherence while keeping within their economic and technological capacities.[17]

Non-legally binding tools and frameworks would permit incremental movement towards solutions on issues that need to be addressed in a timely manner, especially on those issues where political obstacles can make the negotiation of legal instruments a protracted process.[18] For example, while it has been many years since a formal space law treaty has been adopted, the United Nations General Assembly was successful in adopting the United Nations Space Debris Mitigation Guidelines. Similar steps can be particularly useful in maintaining political momentum.

## CHARACTERISTICS OF EFFECTIVE INSTRUMENTS

Some have argued that non-legally binding tools and frameworks are not effective owing to their lack of enforcement mechanisms.[19] Others however, have argued that the continued expansion of humanity's use of space requires the near-term implementation of norms aimed at specific categories of space activities, such as the Space Debris Mitigation Guidelines, in order to develop norms of behaviour.[20] To bring clarity to this debate, it can be of value to look to the characteristics of tools and frameworks that have been successful in developing norms.

One analysis has identified six characteristics that are needed to ensure the development of norms of behaviour.[21] These tools should be transparent as to their non-binding nature. Widespread awareness-raising should accompany a tool or framework so that the relevant actors understand the importance of bringing their activities into line within the desired framework. Clarity and precision of language is required so that actors will know precisely what is being asked and recommended by a relevant tool or framework. Actors must also be able to rely on the fact that adherence to norms will result in their being viewed as responsible members of the community of actors.

Ownership of the consultation and development process by all relevant actors is particularly important as a tool or framework must take into account the spectrum of needs and interests in order to command broad and meaningful support. Otherwise, these instruments run the risk of being out of touch with the needs and interests of stakeholders, and norms will fail to develop.

16 C. Brunner and G. Konigsberger, "'Regulatory Impact Assessment'—a tool to strengthen soft law regulations", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 90.

17 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 61.

18 A. Kerrest, "Treaty vs resolution", ibid., pp. 85–86.

19 A. Lele, "Space code of conduct: inadequate mechanism", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, p. 6.

20 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 57.

21 C. Brunner and G. Konigsberger, "'Regulatory Impact Assessment'—a tool to strengthen soft law regulations", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 94–95.

Awareness of the necessity for adherence, mentioned above, is arguably the most crucial element for adherence and compliance. If stakeholders understand the implications of certain actions, such as abandoning a satellite in an orbit where it is likely to strike another, then it is more likely that actors will self-regulate—which is to say that norms will develop. This is the ultimate goal: to influence group behaviour without formal means of enforcement.

## INITIATIVES FOR THE DEVELOPMENT OF NORMS OF BEHAVIOUR

At present, one of the most advanced initiatives for the development of norms of behaviour for outer space activities is the European Union's proposal for an International Code of Conduct for Outer Space Activities. On 5 June 2012, the EU launched a process to "discuss and negotiate its initiative for an International Code of Conduct for Outer Space Activities".[22] The purpose of the Code is to "enhance the security, safety and sustainability of all outer space activities"[23] by encouraging responsible behaviour in space through the introduction of best practice guidelines. The EU plans to hold a series of open-ended consultations, to which representatives from as wide a range of states as possible will be invited to participate in the development of a Code.[24] It is intended that a final version of the Code will be presented at a diplomatic Conference.[25]

This initiative is being carried out in an ad hoc diplomatic process for two reasons. First, the EU does not consider it suitable to "hold substantive multilateral discussions in any existing international fora dealing exclusively with either non-proliferation and disarmament issues or the civilian uses of outer space".[26] This includes the CD and COPUOS. Second, the EU hopes to broaden the participation in this initiative to non-members of these fora and to bring the process to a timely conclusion for presentation to the United Nations General Assembly for endorsement.[27]

The EU hopes that by introducing voluntary guidelines for behaviour in outer space, it will be able to contribute to the enhancement of international space security alongside the work of other bodies, including the United Nations Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities and the COPUOS Working Group on the Long-Term Sustainability of Outer Space Activities.

## CONCLUSION

The success of any initiative to develop norms of behaviour will rest on several factors, but none so important as the widespread understanding among stakeholders of the need for adherence. Those most likely to comply are those that understand what is at stake. In this context, the states of the Asia–Pacific region will necessarily play a critical role in the development of norms of behaviour for space activities—they stand to benefit significantly from a more secure and stable space environment, and will be in a position to exert great influence on the development of norms to that end.

22 European External Action Service, "The EU launches negotiations on an International Code of Conduct for Outer Space Activities", http://eeas.europa.eu/non-proliferation-and-disarmament/outer-space-activities/index_en.htm/.

23 European Union, *Revised Draft: International Code of Conduct for Outer Space Activities*, 5 June 2012, art. 1.1, www.consilium.europa.eu/media/1696642/12_06_05_coc_space_eu_revised_draft_working__document.pdf/.

24 European Union, "EU Statement—United Nations 1st Committee: outer space", 22 October 2012, paras. 10, 12, www.eu-un.europa.eu/articles/en/article_12753_en.htm/.

25 Ibid., para. 13.

26 Ibid., para. 10.

27 Ibid.

# THE ROLE OF NORMS OF BEHAVIOUR IN AFRICAN OUTER SPACE ACTIVITIES[28]

## INTRODUCTION

Over the last few decades, advances in outer space technology have spread to every corner of the world, changing the way that human beings interact and communicate. Space-based services, once the privilege of a select few states, have reached users of every level of economic and social development, including in the Asia–Pacific region, Latin America, and particularly Africa. Attendees of the recent conference of the African Union Ministers in Charge of Communications and Information Technologies recognized the immense value of space-based services for Africa and the many ways that they are being used to support African social, economic, and security development. Africa is one of the fastest growing markets for telecommunications and is now seeking to broaden its access to a wider array of services to benefit weather forecasting, disaster management, peace, and security.[29] The region has placed high emphasis on integration and utilization of space-based services to further support economic, social ,and security development. Indeed, in recent years, African states have demonstrated—through the investment of time, money, and resources—that they are keen to benefit for outer space technologies, as they are a crucial component of ongoing development.

This growing dependency on space assets will, consequently, expose users of space-based services, to a significantly greater degree, to the rising safety and security risks that exist for space assets. Issues such as space debris and interference with satellites pose increasing threats to the integrity of space assets—assets that provide critical services. The space domain is becoming both congested and an environment where power projection and terrestrial instabilities are being expressed. Gaps in existing international law and national policies have left uncertainty as to how these issues will be resolved. But if they are left unaddressed, it will result in a significant reduction of the usefulness of outer space for all.

It is against this backdrop that the international community has sought to find cooperative solutions within multilateral bodies to the risks and threats to activities in outer space. One solution that has generated considerable discussion is the development of norms of behaviour for outer space activities that would act as voluntary "rules of the road" for space, providing actors with an understanding of the acceptable parameters for the conduct of responsible space activities. Such norms would serve to preserve and enhance stability for all actors in outer space, aiming to ensure a stability that has so far allowed all states to take advantage of the huge benefits space services have to offer. For Africa, a successful implementation of key norms of behaviour should result in the assurance of the long-term sustainability of outer space activities and the realization of Africa's efforts to make outer space services a key component of its long-term development strategies.

## AFRICA'S GROWING USE OF OUTER SPACE AS A TOOL FOR DEVELOPMENT

The outer space domain has served to facilitate a number of economic, social, and environmental developments across Africa. Satellites are a cornerstone of mobile telecommunications and Earth observation, two applications that are used by people all over the continent. As a result

28 UNIDIR would like to thank Gabriella Irsten of Reaching Critical Will for her research contribution to this background paper.

29 Working Documents of the Fourth Conference of African Ministers in Charge of Communication and Information Technologies, 2–6 September 2012, Khartoum, the Sudan, para. 119, http://pages.au.int/sites/default/files/CITMC-4%20Working%20Document-Eng-Final-29082012-MY.pdf.

of end-user technology becoming more widely available, Africa has emerged as the source for some of the highest demand for new space-based services.

### Telecommunications throughout Africa

Telecommunications are highly dependent on space-based infrastructure. In Africa, the sector is growing fast and bringing with it economic and social advances. According to statistics from the International Telecommunication Union (ITU), Africa is less integrated than other regions of the world as regards telecommunications. In 2011, the whole of Africa, a continent with over 1 billion inhabitants, had 434 million mobile-cellular subscriptions; by contrast, Europe, a continent with fewer than 750 million inhabitants, had 747 million subscriptions.[30] Africa had only 27 million mobile broadband subscribers compared to Europe's 226 million subscribers. However, the ITU's statistics also show that Africa's mobile-cellular subscriptions have grown by nearly 500 per cent in the last six years; Europe's growth of just over 25 per cent is modest in comparison. In addition, from 2010 to 2011, Africa's active mobile broadband subscriptions nearly doubled, the highest rate seen in the world during that period. This shows that, while overall usage of telecommunication devices may still be comparatively low, African use of mobile technology is well on the rise and the shift away from fixed-line services will increase Africa's dependence on the space-based services that enable mobile networks. This, once again, highlights the growing dependence of Africa on space-supported services.

If such trends continue, Africa will be one of the most important markets for telecommunication development and innovation. Much of this development has been, and will be, driven by satellite services. As said, telecommunication development in Africa will be highly dependent on the safety and integrity of assets in space. African policymakers therefore have increasing equity in the development of instruments intended to ensure stability in the space domain.

### Economic development enabled by telecommunications

The growth of financial services in Africa is also being supported by continued access to reliable space-based services. There has been a significant rise in the number of financial transactions being carried out through mobile money transfer services, which provide access to digital banking to millions of cellphone users and is rapidly spreading across the continent. It was reported that Kenyan mobile money transfers nearly equalled the national budget in 2012,[31] while in Tanzania, mobile transactions jumped from TZS1.9 million in 2010 to TZS48 million in 2012.[32] Such growth has also been seen in countries such as Botswana, Namibia, Zambia, and Zimbabwe.[33] As more and more Africans integrate this technology into their daily lives, the reliable service of space assets that enable mobile money transfers will become increasingly critical to the African economy.

### Earth observation and remote-sensing for disaster management and sustainable development

Given the extremes of climate and the high incidence of natural disasters in the African continent, space-based imaging services can make a major contribution to improving localized disaster response and resource monitoring and management capabilities. African states have recently been investing in their ability to monitor environmental and climate activity on the continent from outer space in order to better deal with natural disasters. In 2011, Nigeria launched two satellites that last year played a significant role in the management of floods in Africa by

30 ITU, "Key global telecom indicators for the world telecommunication service sector", updated 29 June 2012, www.itu.int/ITU-D/ict/statistics/at_glance/keytelecom.html.

31 E. Okutoyi, "Mobile money transfers in Kenya close to country's national budget", *Humanipo*, 27 November 2012; and also T. Ogunlesi and S. Busari, "Seven ways mobile phones have changed lives in Africa", *CNN*, 14 September 2012.

32 "Mobile money transactions top TZS1.7tn, Bank of Tanzania reports", TeleGeography, 13 December 2012.

33 "Double digit subscriber growth in Southern African mobile markets", Cellular News, 3 May 2010.

providing critical mapping images of Nigeria and surrounding states.[34] The South African Space Agency has developed a significant Earth observation programme that, with funding from the South African Department of Science and Technology, has led to the establishment of an online catalogue of Earth observation data that can be accessed by the general public.[35] The Algerian Space Agency, with its two satellite systems focused on Earth observation, is able to obtain high-quality imagery for management of natural disasters as well as land planning, forestry, and so forth.

However, only six African states have so far acquired domestically owned satellites that provide observation data. Other states have sought partnerships and cooperative efforts in order to make access to space services more widely available. In 2006, the United Nations General Assembly approved the establishment of the Platform for Space-Based Information for Disaster Management and Emergency Response, a programme that has provided data for disaster management and has been particularly active in Africa.[36] The European Union has extended access to the Copernicus Earth observation programme in order to support African environmental policies for sustainable development.[37] The African Resource Management (ARM) satellite constellation, an effort by Algeria, Kenya, Nigeria, and South Africa, is seeking to provide Africans with Earth observation capabilities for resource management applications and to generate indigenous knowledge for the development and transfer of satellite technology.[38] Again, these programmes—which are unlocking exceptional resources for policymakers all across Africa—will be highly dependent on the stability in outer space that has permitted development for people across the world.

### Space and African security

The dual-use nature of space assets, in particular those dedicated to telecommunications and Earth observation, means that even satellites built and launched for civilian purposes can be used to provide services and data that enhance security capabilities. South Africa, for example, has been using Earth observation satellites to monitor illegal fishing and piracy off its coast.[39] Few African states have openly expressed official plans to develop space capabilities for specific security and defence programmes; such options are prohibitively expensive for most states. However, as technology becomes more widely accessible, as seen in the case of nano-satellites and hosted payloads, an increasing number of states will have the means to develop defence programmes based on space capabilities. A consequence of such reliance is that through the incorporation of space technology into national and regional security strategies, African states will increase their dependency on space assets and therefore the need for the outer space environment to remain stable, conflict-free, and as safe and predictable as possible.

Africa's domestic space-related activities are still developing, but its rate of growth of demand for space services is the world's highest. A call has been launched for a joint African space agency to be established which could aid in increasing access to space for the whole continent by sharing costs and risks for the development of space-based services among states. At its

34 National Space Research and Development Agency of Nigeria, "NASRDA's intervention in flood disaster management", www.nasrda.gov.ng/floodmaps.html.

35 South African National Space Agency, "SANSA Earth observation online catalogue", http://catalogue.sansa.org.za; and S. Burger, "Earth observation satellites hold benefits for South Africa", *Engineering News*, 26 October 2012.

36 See United Nations Platform for Space-Based Information for Disaster Management and Emergency Response, www.un-spider.org/?lf=1090&lng=en; and "Space solutions proposed to lessen Africa's vulnerabilities to natural disasters", UN-SPIDER/United Nations Economic Commission for Africa workshop, with support of the government of Austria and in cooperation with Secure World Foundation, Addis Ababa, Ethiopia, 15 July 2010.

37 See www.bragma.eu/home.

38 S. Mostert, "The African Resource Management (ARM) satellite constellation", *African Skies*, no. 12, October 2008.

39 S. Burger, "Earth observation satellites hold benefits for South Africa", *Engineering News*, 26 October 2012.

most recent meeting, the African Union information and communications technology (ICT) ministers requested that the African Union Commission implement the recommendations of a feasibility study carried out on a possible African Space Agency and develop a space policy for the continent in collaboration with relevant stakeholders, noting in particular remote-sensing applications and satellite imagery.[40] If these efforts are to deliver tangible benefits, then African policymakers and strategists will also have to consider the growing risks in outer space, such as space debris and anti-satellite technology, and consider what steps should be taken to protect African endeavours in the future.

## RISKS TO LONG-TERM SUSTAINABILITY IN OUTER SPACE

Outer space is fundamentally difficult to operate in. Aside from the physical realities of the environment itself, the limited awareness of the activities of others, and limited capacity to identify threats, man-made or otherwise, are but some of the risks to making sure that humanity can continue to maximize the benefits of space activities in the long term. There are close to one thousand satellites in outer space, operated by over 60 states and entities. Combined with increasingly cheaper solutions for space-based needs—such as nano-satellites and hosted payloads—it is clear that there will be significantly more traffic introduced into orbit in the coming years.

A major threat to satellites is being struck by a piece of space debris. There are currently thousands of pieces of uncontrollable debris in orbit, the result of satellites breaking up and sections of rockets being discarded or disintegrating.[41] Space situational awareness systems are presently tracking more than 21,000 pieces of debris larger than 10cm, and the debris population of pieces between 1cm and 10cm is estimated at 450,000.[42] This does not include the millions of fragments that are too small to track. If even a small piece of debris (say 1cm) collides with a satellite, given the speeds at which it is travelling, it can cause major damage or disable the satellite completely. It is estimated that the amount of space debris in low Earth orbit, the most populated orbit, has increased by 50 per cent in the last five years alone.[43] The rate at which space debris is increasing means that the risk of collision for space assets is proportionally growing.

Along with advances in the field of civil and commercial space-based services, technology has also emerged that could be used to interfere with the functions of a satellite (such as the jamming of a signal)[44] or its physical destruction by the use of kinetic anti-satellite technology (such as a missile).[45] Both of these capabilities are destabilizing, and, should they become prevalent, would greatly reduce the reliability of space-based services. The threat of cyberattacks on satellite systems, as has been examined in a number of international war games, has also become a growing concern, leading many experts to believe that, in future, military activities will be preceded by cyberattack on an enemy's space capabilities.[46]

These threats present unique challenges to all actors in outer space. What makes challenges in the space domain particularly onerous is that the actions of any single actor can have

40 2012 Khartoum Declaration, adopted by the African Union Conference of Ministers in Charge of Communication and Information Technologies, 4th Ordinary Session, Khartoum, the Sudan, 2–6 September 2012, para. 16, http://pages.au.int/sites/default/files/Declaration_Khartoum_CITMC4_Eng_Final_0.pdf.

41 S. Kibe, "Removing space debris: the urgent need to clean up Earth's Orbital environment", Japan Aerospace Exploration Agency, www.jaxa.jp/article/interview/vol67/index_e.html.

42 See http://orbitaldebris.jsc.nasa.gov/faqs.html#3.

43 S. Cruddas, "ESA plans to clear up space junk", SEN, 3 October 2012.

44 "Satellite interference", Holman Fenwick Willan LLP, 2012, www.hfw.com/__data/assets/pdf_file/0016/18052/HFW-and-ID-Article-Satellite-Interference-A4-4pp-February-2012.pdf.

45 S.A. Kaiser, "Why states should sign the Code of Conduct for Outer Space Activities", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, pp. 91–92.

46 G. Schulte, "Protecting NATO's advantage in space", *Transatlantic Current*, May 2012; and M. Kleiman and S. McNeil, "Red lines in outer space", *The Space Review*, 5 March 2012.

significant consequences for the activities of others. Complicating matters further is the fact that international law does not offer much guidance by way of addressing these specific issues, especially within the relatively limited body of outer space law, which has not seen any significant updates in over 30 years. Since then, new issues have arisen which create novel risks to human space activities. There is a need therefore, for all states—whether established, emerging, or future space actors—to engage in multilateral dialogues in order to find a cooperative international solution that will be capable of mitigating these universal hurdles.

## THE CURRENT REALITY: WHY NORMS OF BEHAVIOUR?

The current political and legal frameworks that support space security are not meeting the needs of today's spacefaring and space-reliant communities. As such, space policymakers have been turning to other options, most notably frameworks of norms of behaviour.

Forming the basis for the current space regime are the five United Nations Outer Space Treaties, the last of which was adopted in 1979 and has only 13 parties. These cover the activities of states in the exploration and use of outer space, including the rescue and return of astronauts, the return of space objects, liability for damage caused by space objects, and registration of objects launched into outer space. No explicit steps have been made towards the adoption of any new space treaties within the United Nations since then.[47] Similarly, the work of the Conference on Disarmament, the single multilateral disarmament negotiating forum of the international community, has found it difficult to make progress on issues regarding outer space for several years due to an inability to come to a consensus on the priorities for its work programme.[48]

As a result of the lack of progress on legally binding instruments within traditional fora, combined with a sense of urgency on the part of the international community to address stability and sustainability issues in outer space, alternative options are being sought by policymakers to address threats in outer space. It is this drive for progress that has lead policymakers to focus on developing non-legally binding solutions that "help establish norms for responsible space-faring nations in the near term … [while] a space treaty could take many years to negotiate, and decades to enter into force".[49]

So, why norms of behaviour? One of the perceived advantages of the norms of behaviour model is the fact that they do not create binding obligations on states, permitting incremental movement towards solutions to issues that need to be addressed in a timely manner, especially those issues where political obstacles can make the negotiation of formal instruments a long and protracted process.[50] For example, while it has been many years since a formal space law instrument has been adopted, the United Nations General Assembly recently adopted the United Nations Space Debris Mitigation Guidelines, prepared by the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space (COPUOS), in order to make tangible progress on the issue of space debris rather than no progress at all.[51] Such small steps can be useful in the maintenance of political momentum on particular issues.

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47 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 57. A commercial space law treaty has recently been adopted, the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets, adopted in Berlin on 11 March 2012, though it has not yet entered into force.

48 T. Caughley, *Breaking the Ice in the Conference on Disarmament: A Wrap-Up*, UNIDIR, 2011.

49 M. Krepon, "Origins of and rationale for a space code of conduct", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, p. 31.

50 A. Kerrest, "Treaty vs resolution", in ibid., pp. 85–86.

51 General Assembly, *Report of the Scientific and Technical Subcommittee on its Forty-Fourth Session, Held in Vienna from 12 to 23 February 2007*, UN document A/AC.105/890**, 6 March 2007, para. 99. It is worth noting that, because the Space Debris Mitigation Guidelines are a non-legally binding document, it was never discussed before the COPUOS Legal Subcommittee.

Norms of behaviour are also often seen as being useful because they provide a level of flexibility that is not possible with traditional, highly structured, legally binding treaties.[52] As has been seen with norms of behaviour in other domains, such as aerospace and maritime activities, rules of the road can be amended with relative ease as circumstances and needs change. This allows different frameworks to be tested before more formal agreements are sought, giving the international community an opportunity to gauge the effectiveness of specific approaches. Furthermore, norms of behaviour can be used as a tool for harmonizing national laws and practices, giving states ample room to move towards adherence in accordance with their own economic and technological capacities.[53]

## CHARACTERISTICS OF EFFECTIVE NORMS

When developing frameworks that will serve as the basis for norms of behaviour, there are certain key characteristics that policymakers should ensure that such norms embody. Some commentators have argued that norms of behaviour are not effective, owing to their lack of enforcement mechanisms.[54] Others however, have argued that the continued expansion of human space activities requires the near-term implementation of norms aimed at specific categories of space activities.[55] To bring clarity to this debate and to assess potential pitfalls in space security norm development, it is of value to look to the characteristics of a successful set of norms in order to judge their usefulness.

One academic analysis has identified six characteristics that are needed to ensure the effectiveness of norms of behaviour.[56]

- Norms should be "transparent" and openly state their non-legally binding nature.
- Widespread knowledge and "publicity" should accompany norms so that the relevant actors are given a meaningful opportunity to bring their activities into line within the desired framework.
- "Clarity and precision" are required in the language of norms so that actors will know precisely what is being asked and recommended by the norms.
- Actors must also be able to "rely" that adherence to norms will not result in negative social stigmas associated with the proscribed behaviour.

In addition to these basic characteristics, widespread "involvement" is particularly important to the development process because norms must take into account a wide array of needs and interests in order to produce an instrument that is capable of commanding meaningful support. To achieve this, it is important to involve those actors that will be affected by the norms throughout the consultation and development process. Otherwise, norms run the risk of being out of touch with the key stakeholders whose behaviour they seek to influence.

Finally, "awareness of the necessity for adherence" is, arguably, the most crucial element for widespread adherence and compliance. If stakeholders are aware of the implications of certain actions, such as abandoning an extinct satellite in a highly populated orbit where it is likely to

52 C. Brunner and G. Konigsberger, "'Regulatory Impact Assessment'—a tool to strengthen soft law regulations", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 90.

53 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 61.

54 A. Lele, "Space code of conduct: inadequate mechanism", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, p. 6.

55 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 57.

56 C. Brunner and G. Konigsberger, "'Regulatory Impact Assessment'—a tool to strengthen soft law regulations", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 94–95.

strike another satellite, then it is more likely that actors will self-regulate. This is the ultimate goal of all frameworks and codes: to influence behaviour without formal means of enforcement.

These characteristics are particularly timely as several consultative processes are presently underway for the development of frameworks and norms of behaviour.

## CURRENT INITIATIVES OF NOTE FOR THE DEVELOPMENT OF A FRAMEWORK OF NORMS OF BEHAVIOUR

At present, there are several initiatives underway in multilateral fora for the development and establishment of norms of behaviour for outer space activities. The first of these is the United Nations Group of Governmental Experts (GGE) on transparency and confidence-building measures in outer space activities, an initiative originating in the United Nations General Assembly First Committee, which "deals with disarmament, global challenges and threats to peace that affect the international community and seeks out solutions to the challenges in the international security regime".[57] The GGE is intended to help improve transparency in space and reduce the risk of misunderstandings and miscommunications between outer space actors.[58] The GGE will produce a report that will outline recommendations for the strengthening of safety and security in outer space and lay the basis for the development of future frameworks and norms of behaviour for space activities. This work is scheduled to be completed in 2013.

Another initiative being carried out under the auspices of the United Nations is the Working Group of the COPUOS Scientific and Technical Subcommittee on long-term sustainability of space activities.[59] The Working Group will make recommendations for measures to ensure safe and sustainable use of space for peaceful purposes. In particular, one of its goals is to produce best practice guidelines, based on current practices and technical considerations, that can apply to all space actors. The Working Group is divided into four subgroups, which cover space utilization, space debris, space weather, and regulatory regimes. The Working Group has been conscious of parallel initiatives being carried out in other fora and has been careful to avoid the duplication of effort. One such effort is the proposal for the development of an international code of conduct for outer space activities.

Lastly, on 5 June 2012, the European Union announced that it would be launching an ad hoc multilateral diplomatic process to "discuss and negotiate its initiative for an International Code of Conduct for Outer Space Activities".[60] The purpose of the Code is to "enhance the security, safety and sustainability of all outer space activities"[61] by encouraging responsible behaviour in space through the introduction of best-practice guidelines. The European Union plans to hold open-ended consultations where representatives from all United Nations Member States are invited to participate in the development of a code.[62] It is intended that the experts at these consultations will present a final version of the code at a diplomatic conference that will be open to all states.[63]

57 See www.un.org/en/ga/first.

58 General Assembly, *Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/RES/63/68, 12 January 2009.

59 General Assembly, *Report of the Committee on the Peaceful Uses of Outer Space*, UN document A/65/20, July 2010, para. 152.

60 European Union External Action Service, "The EU launches negotiations on an International Code of Conduct for Outer Space Activities", http://eeas.europa.eu/non-proliferation-and-disarmament/outer-space-activities/index_en.htm.

61 Article 1.1 of the revised draft International Code of Conduct for Outer Space Activities, www.consilium.europa.eu/media/1696642/12_06_05_coc_space_eu_revised_draft_working__document.pdf.

62 European Union, "EU Statement—United Nations First Committee: Outer Space", 22 October 2012, paras. 10 and 12, www.eu-un.europa.eu/articles/en/article_12753_en.htm.

63 Ibid., para. 13.

The European Union has put forward two reasons favouring an ad hoc diplomatic process. First, the European Union does not consider it suitable to "hold substantive multilateral discussions in any existing international fora dealing exclusively with either non-proliferation and disarmament issues".[64] This includes the Conference on Disarmament and the United Nations First Committee. Likewise, because it would address security issues, the code would not fall under the exclusive ambit of COPUOS, which addresses civil space issues. Secondly, the European Union hopes to broaden the participation in this initiative to non-members of these fora and to bring negotiations to a timely conclusion for presentation to the UN General Assembly for endorsement.[65] In short, broad participation is being sought for the development of a widely-acceptable code that will be open to all States, an approach consistent with the analysis mentioned above.

## CONCLUSIONS: AFRICA AND THE LONG-TERM SUSTAINABILITY OF OUTER SPACE ACTIVITIES

Investment in technology and infrastructure in Africa is booming. The continent's potential for economic and social growth has been recognized by investors both foreign and domestic, and the role to be played by outer space capabilities has been recognized by many as crucial. The solutions that are being sought by many policymakers in Africa are long term in their nature, and they are encouraging both government and private actors to continue to find ways to make outer space a critical part of policy strategies all across the continent.

As such, the time is now for African engagement in the development of the future space security regime. Multilateral efforts for the development of norms of behaviour for outer space activities are of particular importance to African states because their present efforts will mature in a domain affected by existing threats to stability in outer space. It is, therefore, critical for African states to participate in consultations to develop any type of future regime so as to ensure that any resulting instrument accounts for their particular interests, namely those of emerging space actors.

Also, because African states are poised to emerge as new actors in outer space, they also represent a group whose activities will have an impact on stability in the space domain in the coming years. If norms of behaviour are to be effective, they will require a critical mass of states to adopt them, and the emerging actors in Africa will be an important part of that mass. As efforts to finalize multilateral instruments go forward, outreach efforts should be made to ensure that Africa can take a meaningful position in multilateral consultations.

No longer the exclusive domain of superpowers, space is now a truly global endeavour. Ensuring a safe, sustainable, and secure environment for African action in, and utilization of, space is essential if national and regional equity is to be protected and the rewards of space services are to be realized for African economic, developmental, and security gains.

64 Ibid., para. 10.
65 Ibid.

# SEEKING COMPREHENSIVE SOLUTIONS IN SPACE: THE ROLE OF THE AMERICAS IN DEVELOPING NORMS OF BEHAVIOUR

## INTRODUCTION

Over the last few decades, there has been a significant increase globally in the use of space-based services, with more and more actors becoming engaged in space activities. Nearly every state on Earth has some reliance on space technologies. The nature of a state's space activities is shaped by a wide range of social, economic, and political factors, resulting in a broad range of diverse space capabilities. This is particularly evident in the Americas. The United States of America, a leader in space activities for more than 50 years, continues to invest its significant resources into developing extensive civilian and military space programmes to meet its national needs. Most other state space actors in the region, particularly states of Latin America and the Caribbean,[66] have relatively recently begun investing in space technology and have focused their efforts largely on enhancing telecommunication and scientific investigation. Despite their differences, space programmes across the region share a common vision of using space-based benefits to facilitate sustainable socioeconomic development and enhance the lives of all people.

At present, all space activities are at risk from a number of natural and man-made threats to space stability, ranging from solar radiation to space debris.[67] Man-made threats are, in particular, on the rise as outer space becomes increasingly congested and contested, a result of more and more actors seeking to utilize space to meet their specific needs. Due to the physical characteristics of space, many space activities, even if conducted carefully, can have widely-felt consequences for all actors. For example, any space actor, whether established or emerging, can be responsible for a collision that results in the creation of space debris, which in turn can lead to further collisions.[68] Members of the international community are increasingly aware of the importance of space activities being carried out in a manner that will not jeopardize the future use of the space domain.[69]

Against this backdrop, several multilateral initiatives have arisen that seek to address space security threats through the establishment of norms of behaviour for space activities. These norms represent voluntary "rules of the road" for space activities, providing actors with guidance on the parameters of responsible behaviour in space. Such voluntary measures are implemented or adhered to by states through domestic means, making wide-spread support for norms of behaviour a critical factor for their effectiveness. While seen as a potentially valuable and timely tool for addressing space security and sustainability, developing international norms that are able to command wide-spread support presents numerous challenges because of the wide range of needs and interests at play.[70] These challenges are particularly acute in the Americas where there are sharp divides between the technical and political needs of the regional space actors.

66 Latin America and the Caribbean, as defined by the United Nations, includes those countries located in the Caribbean, Central America, and South America.

67 F.A. Rose, "Pursuing space TCBMs for long-term sustainability and security", delivered at the International Symposium on Sustainable Space Development and Utilization for Humankind, Shinagawa, Tokyo, 28 February 2013. UNIDIR, *Space Security Conference 2012*, p. 5, www.unidir.org/files/publications/pdfs/space-security-2012-en-306.pdf.

68 "Ecuador Pegasus satellite fears over space debris crash", BBC News, 23 May 2013.

69 General Assembly, *Report of the Committee on the Peaceful Uses of Outer Space*, UN document A/67/20, paras. 177–188.

70 UNIDIR, *A Brief Overview of Norms Development in Outer Space*, 2013.

This paper will analyse the example presented by the Americas as a microcosm of wider global perspectives on space security and the implications of the diverse interests being taken into account when building norms of behaviour. Specifically, it will examine developing space capabilities in the Americas, the recent activities of these states in multilateral forums related to the development of international frameworks for space activities, and the possible role of actors in the region in the development of future norms.

## SPACE ACTIVITIES ACROSS THE AMERICAS

When looking at the space capabilities of states in the Americas, there is a sharp distinction between the United States, on the one hand, and Latin American and Caribbean states, on the other. These differences can be attributed to several factors. First, these states have disparate levels of access to economic and technological resources. Second, while sharing many objectives regarding their space activities, some applications, such as military applications, are seen in a considerably different light by Latin American and Caribbean states than by the United States.

Since the beginning of the space age, the United States has been one of the world's principal space actors. The United States is one of the few states that has engaged in manned spaceflight, and carries out a wide array of scientific, commercial, and military space activities. Its space capabilities are largely reflective of the early, formative days of space exploration when the United States and the Soviet Union were engaged in the Cold War and outer space was seen as a potential stage for armed conflict.[71] As a result, the United States maintains one of the most highly developed military space programmes, one with a mandate to explore offensive counter-space technology, which can be used to "neutralize an adversary's space systems or the information they provide".[72] Even though the recent economic downturn has forced budget cuts to scientific and military space programmes, the United States continues to invest heavily in its space sector.

Where the United States has developed an extensive military space programme, states across Latin America and the Caribbean have developed their space capabilities in a very different manner. In the last two decades, numerous states have emerged as rising players in outer space thanks to recent economic growth, technological innovation, new trade relations, and the emergence of the commercial space sector.[73] The motivation behind much of theses space activities is sustainable development, with a particular emphasis on telecommunication.[74] According to the International Telecommunication Union (ITU), by the end of 2011, 20 of the 33 countries in Latin America and the Caribbean—including Argentina, Brazil, Chile, Ecuador, Guatemala, Panama, Peru, and Uruguay—had more mobile cellular subscriptions than inhabitants.[75] Other applications being explored are resource management, disaster mitigation, and climate monitoring. There is little indication that any efforts are being made by most states in the region to acquire counter-space technology. On the contrary, most space actors in the region have spoken out against the development of such capabilities.[76]

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71 T. Hitchens, "Multilateralism in space: opportunities and challenges for achieving space security", *Space and Defense*, vol. 2, no. 4, 2010.

72 T. Wilson, "Threats to United States capabilities", prepared for the Commission to Assess United States National Security Space Management and Organization, 2000. V. Samson, "Space control in the Air Force's 2014 budget request", *The Space Review*, 22 July 2013.

73 A. Sanchez, "Latin America's space programs in 2012", The Space Review, 27 August 2012.

74 See J.M. Forman et al., *Toward the Heavens: Latin America's Emerging Space Programs*, Center for Strategic and International Studies, 2009.

75 ITU, "Latin America and the Caribbean key statistical highlights: ITU data release June 2012", www.itu.int/net/newsroom/Connect/americas/2012/docs/americas-stats.pdf.

76 From the thematic debate on disarmament aspects of outer space of the United Nations General Assembly, 23 October 2012, see statement by Brazil, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/23%20Oct%20TD%20Clust%203%20Brazil.pdf; and statement by Indonesia on behalf of the Non-Aligned Movement, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/22%20Oct%20TD%20Clust%203%20Indonesia%20(NAM).pdf.

Currently, new partnerships with states abroad are developing in the region, with space actors such as the People's Republic of China, India, the Russian Federation, and a number of European states contributing to civilian-oriented or scientific projects.[77] The rise of private space actors has also had a significant impact on regional space activities over the last few years, with companies such as SES and Intelsat seeking to meet the demands of a growing population for more and more space-based services.

Brazil has, in particular, emerged as a regional leader in space activities. Thanks to a strong economy, it has recently been able to pledge significant resources to the development of a comprehensive space programme, including manufacturers, operators and, most notably, national launch service providers.[78] While Brazil has indicated that it is seeking to make space capabilities a part of its national defence programme, currently its activities in space remain largely of a civilian nature.

Despite the different paths taken by these states on the way to developing space capabilities, significant efforts are being made to find opportunities for cooperation in space as a means of improving international relations. For example, the United States has historically made environmental data available to Latin American and Caribbean states in order to enhance decision-making capabilities for sustainable development.[79] The easing of US export controls for certain types of space technology also suggests that there could be greater access for Latin American and Caribbean states to important commercial space services, potentially increasing economic cooperation with the United States.[80] These practical efforts to increase cooperation could serve as the foundation for the finding of common solutions to address space security issues that bridge the distinct approaches thus far adopted by the United States and Latin American and Caribbean states.

## DISTINCT APPROACHES TO SPACE SECURITY

There are a number of man-made security threats that increasingly put the stability of space at risk, but there are two in particular that have become the centre of significant discussion at the multilateral level: space debris and the risk of armed conflict in outer space. These two issues are not directly addressed by the existing regulatory framework of space activities, and so policymakers are presently engaged in a number of ongoing discussions to find realistic solutions to these threats to the long-term sustainability of space activities.[81]

### Space debris

Space debris refers to non-functional, man-made objects either in orbit or re-entering the Earth's atmosphere. These objects, which have been multiplying significantly over the last five years, are capable of causing catastrophic damage to any space asset or person as the result of a collision.[82] Without further intervention, it is likely that the current growth of space debris

77 J.M. Forman et al., *Toward the Heavens: Latin America's Emerging Space Programs*, Center for Strategic and International Studies, 2009, p. 7.

78 P. Carriel, "Brasil reforça programa espacial", *Gazeta do Povo*, 16 October 2011. "Alcantara Cyclone Space board meets in Kyiv to discuss Cyclone-4 project", Interfax-Ukraine, 30 April 2013. A. Sanchez, "Latin America's space programs in 2012", *The Space Review*, 27 August 2012. J.M. Forman et al., *Toward the Heavens: Latin America's Emerging Space Programs*, Center for Strategic and International Studies, 2009, pp. 6–7.

79 See for example Sistema Regional de Visulización y Monitoreo de Mesoamérica, www.servir.net; "NASA hosts symposium about Latin American space partnerships", NASA press release, 16 September 2010.

80 "State and Commerce publish proposed rules for Category XV", Export Control Reform Blog, 29 May 2013, http://export.gov/ecr/.

81 J. Beadsworth, "Developing voluntary rules of the road for the enhancement of safety, stability and security in outer space", presented at the UNIDIR seminar "Space equities: the role of the Americas in building norms of behaviour", Mexico City, 1–2 July 2013.

82 C. Mathieu, "Space debris: a challenge for all actors", presented at the UNIDIR seminar "The role of norms of

will render the most congested orbits all but unusable within the next 100 years.[83] This threat is a concern to all space actors as debris is a threat to all actors, regardless of their level of space development, as seen in the 2009 collision of the Iridium and Kosmos satellites.[84]

The United States, whose large fleet of space assets is constantly at risk from space debris, mitigates this threat through technical and political measures. First, it has developed a highly sophisticated tracking system that gives it the ability to anticipate collisions with debris.[85] Secondly, it is a leader in ongoing efforts to develop multilateral tools for the mitigation of space debris, particularly voluntary norms of behaviour. The United States' National Aeronautics and Space Agency (NASA), along with five other state space agencies from around the world, is a member of the Inter-Agency Space Debris Coordination Committee that developed the Space Debris Mitigation Guidelines, a set of voluntary technical recommendations for the manufacturing, launching, and operating of a space asset so that debris creation can be reduced. These guidelines, endorsed by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) as useful a tool for the mitigation of debris, were partly based on the best practices developed by the United States to avoid the creation of debris in space activities.

A number of Latin American and Caribbean states, such as Argentina, Brazil, Chile, and Mexico, are also taking an active role in the work of ongoing initiatives to ensure that a solution to the problem of space debris can be found that will meet the needs of all space actors. However, several states in Latin America and the Caribbean have proposed that any mitigation measures must be equitable in their approach, taking into account the fact that that established space actors are responsible for the majority of existing space debris.[86] Their major concern is that space debris mitigation measures will impose an undue burden on emerging space actors, forcing these new actors to bear the cost for debris created by established space actors. Specifically, some space debris mitigation measures call for the moving of assets to end-of-life orbits or to re-enter the atmosphere at the end of life, all of which can increase the cost of manufacturing and launch as well as reducing the useful life of the asset in question. As discussions on new space debris mitigation measures go forward, this will be a point of concern for many emerging space actors, including many in the region, that will need to be resolved in order to win support among these actors. This will be particularly important for norms of behaviour, many provisions of which must be enacted voluntarily at the national level by states themselves.

### Armed conflict and outer space

The 2007 destruction of a Chinese satellite in orbit, followed by the 2008 destruction of an American satellite as it re-entered the Earth's atmosphere, sparked significant concern among the space community. Part of this concern is related to the fact that the 2007 incident resulted in one of the single largest clouds of orbital debris ever produced by human activity.[87] The other

behaviour in African outer space activities", held in Addis Ababa, 7–8 March 2013.

83 "Stability of the future LEO environment", a report of a study carried out by the Inter-Agency Space Debris Coordination Committee, presented to the Scientific and Technical Subcommittee of COPUOS, Vienna, February 2013.

84 B. Iannotta and T. Malik, "US satellite destroyed in space collision", Space.com, 11 February 2009.

85 It should be noted that the United States' capabilities to track space assets have recently been reduced as a result of budget cuts to its Air Force Space Surveillance System; M. Gruss, "Gen. Shelton on Space Fence closure and the road ahead", *SpaceNews*, 28 August 2013.

86 J. Monserrat Filho, "Space debris: the primary space security threat", presented at the UNIDIR seminar "Space equities: the role of the Americas in building norms of behaviour", Mexico City, 1–2 July 2013. R. Ma. Ramírez de Arellano y Haro, "UN COPUOS: Grupo de Trabajo sobre la Sostenibilidad a largo plazo de las actividades en el espacio ultraterrestre", presented at the UNIDIR seminar "Space equities: the role of the Americas in building norms of behaviour", Mexico City, 1–2 July 2013.

87 C. Mathieu, "Space debris: a challenge for all actors", presented at the UNIDIR seminar "The role of norms of behaviour in African outer space activities", Addis Ababa, 7–8 March 2013.

major concern with this incident relates to outer space becoming a theatre for armed conflict.[88] Militaries from all over the world have been using space to facilitate strategic operations for many years, using space assets for everything from communications between troops to intelligence gathering. In this context, outer space has long been militarized. However, the weaponization of outer space has not yet occurred.

The concept of space weaponization has a number of key definitional problems that make mitigation efforts difficult. First, it is unclear what constitutes an outer space weapon. While certain counter-space technology is easy to identify, such as a ballistic missile or laser, others are more difficult since even a satellite could be used to destroy another asset by means of an intentional collision. Secondly, it is unclear whether only objects placed in outer space constitute "space weapons". It is also unclear if technology launched from Earth at targets in space, as in the case of the two incidents mentioned above, is a part of the weaponization of outer space, likewise the transit of technology through space on its way to a target on Earth, such as in the case of intercontinental ballistic missiles. The common fear regarding all these developments is that they will ignite an arms race in outer space that will ultimately lead to armed conflict capable of destroying the relative stability currently enjoyed in space, stability that has facilitated significant development for people all over the world. Given this, it is concerning that current trends would seem to indicate that the weaponization of outer space is becoming more likely. Today, a number of states have openly declared their intent to develop ballistic missile technology, which could as well be used to target objects in space.[89] Additionally, numerous other states have begun experimenting with other means of destroying or disabling a space asset, including jamming devices and cyberattacks. These varied forms of attack all share a destabilizing nature for space activities because they reduce the reliability of space-based services, increase the risk of harm or interference to space assets, and could lead to the proliferation of space debris.

The United States and the Latin American and Caribbean states have markedly distinct policy approaches to this issue. The United States has made both offensive and defensive counter-space operations a major component of its national defense policy. Its former position of rejecting any agreement that would constrain the United States' freedom of activity in space (including counter-space operations) has been softened in its 2010 space policy, which opens the possibility of accepting an arms control agreement in space provided that it is equitable and effectively verifiable.[90] However, the United States has maintained that it has the right to defend its space systems, including through the use of counter-space technology, in accordance with the concept of the inherent right of self-defence.[91] This position is difficult to reconcile with that of many Latin American and Caribbean states, which have been voicing the view that outer space should be strictly used for peaceful purposes.[92] This is consistent with the region's history of adopting sweeping legislation banning controversial technology, such as the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean.

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88 T. Hitchens, " Weapons in space: silver bullet or Russian roulette? The policy implications of US pursuit of space-based weapons", in J.M. Logsdon and G. Adams (eds.), *Space Weapons: Are They Needed?*, 2003.

89 A.K. John, "India and the ASAT weapon", Observer Research Foundation, Issue Brief no. 41, August 2012. B. Opall-Rome, "Israeli experts: Arrow-3 could be adapted for anti-satellite role", *SpaceNews*, 9 November 2009. T. Hitchens, "An ASAT arms race: the slippery slope to space weaponization", *Disarmament Times*, 2007.

90 J. Kueter, "Evaluating the Obama national space policy: continuity and new priorities", George C. Marshall Institute, Policy Outlook, July 2010, pp. 8–10.

91 *National Space Policy of the United States of America*, 28 June 2010.

92 From the thematic debate on disarmament aspects of outer space of the United Nations General Assembly, 23 October 2012, see statement by Brazil, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/23%20Oct%20TD%20Clust%203%20Brazil.pdf; and statement by Indonesia on behalf of the Non-Aligned Movement, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/22%20Oct%20TD%20Clust%203%20Indonesia%20(NAM).pdf. Statement of the Group of 21 on PAROS to the CD, 6 July 2010, www.unog.ch/80256EDD006B8954/(httpAssets)/A022D48295D9ED07C1257759004575FC/$file/1188_G21.pdf.

At the multilateral level, this issue of armed conflict in space is being discussed within the Conference on Disarmament (CD), the single multilateral disarmament negotiating forum of the international community, and the First Committee of the United Nations General Assembly. Within the CD, a standing topic of work is the prevention of an arms race in outer space (PAROS) under which work on a treaty on the prevention of the placement of weapons in outer space has been undertaken. However, the CD, as a body, has been at a standstill for almost two decades, which makes outcomes on space issues currently impossible to achieve. The United States in particular has stated that, as mentioned above, it is willing to accept arms control measures provided that they are equitable and verifiable; however, it is its position that no such proposal has been put forth, including the Russian and Chinese joint proposal for a Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT).[93]

As an alternative, the United States has proposed the development of voluntary measures within the First Committee of the General Assembly, the other multilateral body addressing the potential spread of armed conflict into space, to reduce tensions created by mistrust in space activities. In particular, it has promoted the adoption of transparency and confidence-building measures (TCBMs) as a means of promoting openness and trust among states through information exchange in activities that create security concerns. Brazil, Chile, and the United States were members of the recent United Nations Group of Governmental Experts (GGE) on TCBMs. The GGE was asked to provide recommendations on voluntary TCBMs to mitigate the dangers of a congested and contested space environment. The GGE will present this report in 2013.

While voicing their support for voluntary measures as intermediary solutions to space security issues, numerous Latin American and Caribbean states have continued calling for a formal treaty preventing the placement of weapons in outer space, with some taking note of the PPWT proposal as a starting point for negotiations.[94] This position is partly driven by the fact that these states do not have the capabilities to engage in armed conflict in space and an absolute ban on weaponization of space would best ensure the integrity of space assets belonging to them. While the question of arms control in space has created friction between the United States and Latin America and the Caribbean in the past, the shift in the United States' tone over the last few years suggests that there is now a possibility for compromise on this issue.

## THE ROLE OF THE AMERICAS IN BUILDING NORMS OF BEHAVIOUR

The negotiation of legally binding instruments is an arduous task that can take many years. The last formal United Nations space treaty to be adopted was the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, an instrument which received considerably less support than its predecessors.[95] In light of the CD's inability to make progress, there are few options for adopting new multilateral regulations to address growing space security concerns. It is for this reason in particular that policymakers have turned to voluntary

93 Statement of the United States From the thematic debate on disarmament aspects of outer space of the United Nations General Assembly, 22 October 2012, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/22%20Oct%20TD%20Clust%203%20USA.pdf.

94 Statement of Argentina to the CD, 3 March 2008, www.unog.ch/80256EDD006B8954/(httpAssets)/500D60387260B9B3C125740100558332/$file/1095_Argentina_S.pdf; and statement from the thematic debate on disarmament aspects of outer space of the United Nations General Assembly by Indonesia on behalf of the Non-Aligned Movement, 22 October 2012, www.un.org/disarmament/special/meetings/firstcommittee/67/pdfs/Thematic/22%20Oct%20TD%20Clust%203%20Indonesia%20(NAM).pdf. F. Romero Vazquez, "Space for development: a regional game changer?", presented at the UNIDIR seminar "Space equities: the role of the Americas in building norms of behaviour", Mexico City, 1–2 July 2013.

95 The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the Outer Space Treaty) presently has 102 parties, while the Moon Agreement only has 15.

norms of behaviour as a means of mitigating clear and present dangers in space in the absence of legal solutions. The establishment of such norms does not necessarily preclude the further negotiation of treaties and may even serve to make actors more comfortable with certain standards of conduct in anticipation of adopting legal commitments. Nevertheless, much of the attractiveness of norms lies in their non-legally binding nature.

At present, there are three important initiatives currently underway for the development of norms, namely the GGE, the Working Group of the Scientific and Technical Subcommittee of COPUOS on the Long-Term Sustainability of Space Activities (LTSSA), and the European Union's proposed International Code of Conduct for Outer Space Activities (ICoC). Each of these initiatives will need to put effort into ensuring that the resulting reports, guidelines, or codes they will produce can command widespread support. These challenges will be manifest as the United States and many Latin American and Caribbean states seek to reconcile their different approaches to current space security issues. In this context, part of the role of the Americas in the building of norms of behaviour will be to identify the major substantive issues to be resolved between established and emerging space actors.

### GGE

As discussed above, the recommendations of the GGE will be aimed at preventing miscommunication and miscalculation that could result in increased security tensions among states in space. As the objective of the GGE is to identify simple mechanisms for increasing trust, states across the Americas have shown early signs of strong support. Nevertheless, it is likely that a number of Latin American and Caribbean states will continue calling for the adoption of a formal treaty on the prevention of the placement of weapons in outer space, arguing that a legal rather than political instrument is required to ensure the long-term sustainability of space activities.

### LTSSA

The LTSSA is seeking to develop technical rather than political guidelines to further enhance long-term sustainability in space. This Working Group has four subgroups: A) developing guidelines on sustainable space utilization supporting sustainable development on Earth; B) space debris, space operations, and tools to support space situational awareness sharing; C) space weather; and D) regulatory regimes and guidance for new actors in the space arena. As these guidelines will be of a technical nature, they should be drafted bearing in mind the limited capabilities and resources of emerging actors. Otherwise, the Working Group risks producing guidelines that can only be adhered to by the few established space actors, such as the United States.

### ICoC

The ICoC initiative seeks to establish voluntary norms of behaviour based on best practices for all space activities, including civilian and military activities, in order to mitigate the threats facing a congested and contested space environment. These norms include space debris mitigation measures as well as information and data exchanges as a form of TCBMs. The United States has been a strong advocate of this initiative, though with some domestic reservations regarding the non-binding nature of such voluntary tools.[96] A number of Latin American and Caribbean states, while supporting the overall aim of enhancing security in outer space, have expressed

96 It is worth noting that the US Congress has continued protecting the United States' freedom of action in space, going so far as to declare that if the US should become a signatory to the ICoC, the President will have to assure Congress that it will not limit the United States' activities in space in any way; *National Defense Authorization Act for Fiscal Year 2013*, § 913, http://docs.house.gov/billsthisweek/20121217/CRPT-112HRPT-705.pdf.

reservations regarding the possible imposition of undue technical burdens on emerging states, the creation of barriers to entry into space, and perhaps enabling the spread of armed conflict into outer space through the inclusion of a reference to the inherent right of self-defence.[97] This last concern is particularly sensitive as others in the international community are of the opinion that, under international law, a state always has the inherent right of self-defense, as laid out under Article 51 of the Charter of the United Nations, and that is no less applicable to outer space.

## CONCLUSION

Any analysis of outstanding political and technical issues often highlights differences between actors' positions without sufficiently emphasizing common interests. Space security issues are, on the surface, no different. The United States, a well-established space actor, has sought to establish, first, voluntary guidelines that will reduce the risk of space debris proliferation and, secondly, political obligations that will increase transparency and confidence among states. Many Latin American and Caribbean states, nearly all of which are still in the early stages of developing domestic space capabilities, seek, first, solutions to space debris that will not impose undue burden on their nascent space programmes and, secondly, an outright ban on the weaponization of outer space. These positions are not mutually exclusive. All actors in the Americas are in agreement that space debris must be addressed and that armed conflict in space would have catastrophic consequences for all space activities. As the states of the region strengthen diplomatic relations through cooperation on scientific civil space activities, they might also seek solutions on space security issues that command widespread support from both established and emerging space actors.

In this context, the Americas as a region has the potential to be key in bridging differences on space security issues. Many of the differences found in the Americas are also seen in other regions of the world, with emerging and established space actors having distinct sets of concerns regarding space security. By identifying the common interests of established and emerging space actors within the Americas, policymakers in the region will help bridge gaps shared by global actors. Doing so can enable the finding of comprehensive solutions that appeal to all space actors. In anticipation of further discussions on the numerous initiatives to establish norms of behaviour, dialogue among actors in the Americas can aid in the development of common approaches that might command widespread support among all space actors.

97 See report of the UNIDIR seminar "Space equities: the role of the Americas in building norms of behaviour", Mexico City, 1–2 July 2013.

# AN ANALYSIS OF EMERGING SPACE CAPABILITIES IN EURASIA AND RISING SECURITY TENSIONS

## INTRODUCTION

Eurasia is an active region in terms of space activities.[98] States in the region use sophisticated space assets to provide critical telecommunications, resource management, and disaster mitigation tools on a daily basis, and they explore new ways to use space to benefit national development. Some states in the region are exporting their knowledge, technology, and expertise to other actors seeking to benefit likewise. This has contributed to the rapid growth in space activities and the emergence of numerous new space actors all over the world.

While outer space was once the domain of only two actors, there are now over 60 states engaged in space activities. The dramatic rise of activities has changed the space environment significantly, making it increasingly "congested and contested".[99] As a result, as more states seek to utilize the most useful—but limited—orbits, the likelihood of clashing interests is also rising. An increased number of satellites on orbit, for example, means a greater likelihood of accidental collision or harmful interference. But threats deriving from accident are only a portion of the dangers to space assets. Technology is being developed that could be used for intentional harm or interference. This is resulting in heightened security tension throughout Eurasia, as well as the rest of the world.

Space activities are not excluded from the wider picture of regional security in Eurasia. The growing dependence of states on space-based services, combined with the emergence and proliferation of space-enabled weapons, has created anxieties about the integrity and safety of space assets, particularly because of the strategic advantages that space capabilities can offer the "haves" over "have-nots".[100] Given the dual-use nature of space technology—meaning that similar capabilities can be used for both civil and military purposes—even seemingly peaceful space programmes have created disquiet. It is not infeasible that, when taken in the context of wider security concerns, legitimate space activities might lead to open hostility or give rise to the spread of armed conflict into outer space. such a result would impact all space actors, including the numerous emerging actors in Eurasia.

Against this backdrop, policymakers are looking for solutions to ease tensions over the development of space capabilities in order to ensure the long-term sustainability of space activities. One option that has gained significant support is the development of norms of behaviour for space activities. Such norms are voluntary "rules of the road" that set parameters for what is considered by the international community to be responsible behaviour in outer space. In particular, discussions are underway for the development of transparency and confidence-building measures (TCBMs) that might mitigate the impact of space capabilities on existing security dilemmas. However, because these measures are voluntary and must be enacted at the national level, it will be important to convince states that compliance with these norms will not jeopardize their national security objectives. This will present a significant challenge in Eurasia, where security tensions are high. As a number of Eurasian states are

98 Eurasia, as defined by the United Nations, consists of those countries located in Eastern Europe as well as Southern and Central Asia.

99 F. Rose, speaking at the UNIDIR Space Security Conference 2013: Enhancing Confidence, Securing Space Stability, Geneva, 2–3 April 2013.

100 S. Unnithan, "India has all the building blocks for an anti-satellite capability", *India Today*, 27 April 2012; "U.S. missile shield no threat to Russia–Deputy PM", *RIA Novosti*, 16 April 2013; "Pakistan considers India's ballistic missile system as destabilizing development: Foreign Office", *The Nation*, 9 May 2013.

poised to be major space players in the near future with significant military space capabilities, their support will be of particular importance to the implementation of norms of behaviour.

## EURASIAN SPACE RESOURCES AND SECURITY CONCERNS

Following the breakup of the Soviet Union, several states in Eurasia inherited space expertise and capabilities. The direct beneficiaries were the Russian Federation and Ukraine, two of the leading states in terms of space activities.[101] Other states, such as Kazakhstan (home of the launch facility at Baikonur), have indirectly become active players in the space domain as a result of their proximity and economic/political ties to major space players.[102] These states have sought to strengthen economic and diplomatic ties with aspiring space actors not only in the region but all over the world by exporting their space capabilities. For example, in addition to its own domestic investments in space technology, the Russian Federation provides launch services (the majority of which are provided in Kazakhstan) for numerous clients.[103] Similarly, Ukraine is working closely with Brazil to establish a new launch facility in South America based on Ukrainian technology.[104] The major exception in the region to the development of space capabilities is India, which has emerged as a leading space actor without external technical assistance.[105] The sum of the rapid growth in space activities—which is not limited to Eurasia but is gaining notable momentum there—is changing the daily realities of these activities.

While outer space provides benefits for people all over the world, the environment poses challenges. Outer space is inherently hostile to humans and their activities, with natural phenomena such as solar radiation and asteroids posing a constant threat to space assets. The rise of human space activities has introduced a new set of threats in addition to the natural ones. Most notable is space debris, which includes all non-functioning man-made objects and fragments in orbit or re-entering the atmosphere.[106] Debris travels at extremely high velocities and poses a significant threat to all space assets, regardless of origin or function. The immediate consequence of a collision is that each one creates even more debris, making this threat self-propagating. The fact that most space activities are carried out in a limited number of orbits, such as the low-Earth orbits (between approximately 160 and 2,000 kilometres above the Earth), means that the bulk of debris is concentrated there, increasing the likelihood of collision. The threat of debris is not theoretical, with several notable collisions having taken place in the last few years.[107]

While the threat of space debris exists outside of politics, space activities do not. Space technology has been widely embraced as a critical strategic domain by leading military powers, some of which have clashed in the last few decades.[108] Rising tension between India and China, both nuclear and space-faring states, could mean conflict between the two over the preservation

101 The Russian Federation and Ukraine were counted among the top 15 global leaders by the Futron 2012 Space Competitiveness Index, a comparative analysis on how states invest in and benefit from the space sector.

102 Z. Karipbayeva, "Development of space activities in the Republic of Kazakhstan", and N. Asselkan, "Regional prospects: the outlook for space activities across Eurasia from an independent media perspective", presented at the UNIDIR regional seminar Building Confidence for Eurasian Space Activities through Norms of Behaviour, Astana, 2–3 October 2013.

103 P.B. de Selding, "Russia boosting space budget to surpass China, equal Europe", *SpaceNews*, 5 June 2013; Committee on the Peaceful Uses of Outer Space, *National Activities and International Cooperation of the Russian Federation in the Exploration and Use of Outer Space for Peaceful Purposes in 2012 (as of 31 December 2012)*, UN document A/AC.105/C.1/2013/CRP.22, 18 February 2013.

104 A. Svitak, "Ukraine, Brazil prepare for 2015 Cyclone 4 launch", *Aviation Week*, 24 September 2013.

105 G. Madhavan Nair, "Achieving self-reliance in space programme", Indian Press Information Bureau, 2 August 2007.

106 Inter-Agency Space Debris Coordination Committee Space Debris Mitigation Guidelines, § 3.1; C. Mathieu, "Space debris: a challenge for all actors", presented at the UNIDIR seminar The Role of Norms of Behaviour in African Outer Space Activities, Addis Ababa, 7–8 March 2013.

107 "Ecuador Pegasus satellite fears over space debris crash", *BBC News*, 23 May 2013; B. Iannotta and T. Malik, "U.S. satellite destroyed in space collision", *Space.com*, 11 February 2009.

108 A. Lele, *Asian Space Race: Rhetoric or Reality*, Institute for Defence Studies and Analysis, 2013, p. 7.

of space capabilities.[109] India could face another rival in space if Pakistan, a nuclear neighbour, is successful in developing its own launch capabilities.[110] The tension between the United States and the Russian Federation over missile defence systems has also triggered renewed efforts by the Russian Federation to protect its interests from perceived Western threats.[111] Significant fears have also emerged that the United States and China could become adversaries in outer space.[112] It is feared that the tense relationships between the two could lead to space becoming a new theatre for armed conflict. An examination of space technology and its role in military activities reveals some of the sources of tension created by space capabilities and offers some insight as to how this tension might be mitigated.

## GROWING MISTRUST THROUGH SPACE CAPABILITIES

Several factors have given rise to new fears regarding the potential use of military space capabilities in an offensive role. One factor is that space assets have come to represent very real vulnerabilities, in that they provide critical services for numerous socioeconomic and defence sectors. This makes space assets attractive strategic targets and raises concerns, particularly among the established space actors, over the potential loss of space-based services. The failure of satellite systems, for example certain telecommunication satellites, could have significant repercussions for those relying on those services.[113] For states such as the Russian Federation and India, whose space programmes are major components of their critical infrastructure, space assets are a significant vulnerability.

Another contributing factor is that the technology to strike space assets is becoming more prevalent. Much of the current concern with counter-space technology can be traced to 2007 when China destroyed a failed satellite with a kinetic anti-satellite missile, followed in 2008 by the United States destroying a failed satellite as it re-entered orbit.[114] The former incident was seen as particularly dangerous for the overall stability of space because it created one of the largest man-made clouds of space debris in history, capable of causing catastrophic damage[115] Despite such negative consequences, India has taken steps to develop similar technology in order to protect its interests in space, and some have argued that India should take immediate steps to demonstrate such capabilities.[116] As a result, Pakistan might also follow suit.

109 R. Pillai Rajagopalan, *Clashing Titans: Military Strategy and Insecurity among Asian Great Powers*, Observer Research Foundation, 2012, pp. 33–35; C. Couvalt, "India races China in space for Asian prestige, military security", *Space Quarterly Magazine*, December 2012; A.K. John, *India and the ASAT Weapon*, Observer Research Foundation Issue Brief no. 41, 2012.

110 A. Lele, *Asian Space Race: Rhetoric or Reality*, Institute for Defence Studies and Analysis, 2013, p. 57; S. Khajuria, "Heavy Pakistani firing along international border, again", *Times of India*, 19 October 2013.

111 "Russia prepares a response to US missile defense plan", *RIA Novosti*, 11 October 2012; R. Pillai Rajagopalan, *Clashing Titans: Military Strategy and Insecurity among Asian Great Powers*, Observer Research Foundation, 2012, pp. 148–150.

112 M. Krepon and J. Thompson (eds.), *Anti-Satellite Weapons, Deterrence and Sino-American Space Relations*, 2013.

113 V. Anand, *China's Evolving ASAT Capabilities: Implications for India*, Vivekenanda International Foundation, 27 May 2013; Report of the Commission to Assess United States National Security Space Management and Organization, pursuant to Public Law 106-65, Washington, D.C., 11 January 2001, pp. viii–ix; P. Podvig, "Russia and military uses of space", *Russian Strategic Nuclear Forces*, 1 July 2004. The potential consequences of these dangers were seen in 1998 when the failure of a single satellite resulted in the loss of service to 80 per cent of the United States' 45 million pagers; F. Roylance, "Orbiting switchboard pulls plug on U.S. Millions experience failure to communicate", *Baltimore Sun*, 20 May 1998.

114 W.J. Broad and D.E. Sanger, "China tests anti-satellite weapon, unnerving U.S.", *New York Times*, 18 January 2007; T. Bowman, "China protests after U.S. shoots down satellite", *National Public Radio*, 21 February 2008.

115 C. Mathieu, "Space debris: a challenge for all actors", presented at the UNIDIR seminar The Role of Norms of Behaviour in African Outer Space Activities, Addis Ababa, 7–8 March 2013.

116 A.K. John, *India and the ASAT Weapon*, Observer Research Foundation Issue Brief no. 41, August 2012; T. Hitchens, "An ASAT arms race: the slippery slope to space weaponization", *Disarmament Times*, Summer 2007.

Kinetic anti-satellite missiles are only one form of counter-space technology. Numerous other forms have emerged that are more cost-effective and logical in terms of asymmetric warfare. One form that has seen a rise in use is signal jamming, which does not physically affect a satellite but rather interferes with its functions. This technology has seen a significant increase in use since 2010.[117] Another form is based on cyberattack, wherein a hacker can take control of vulnerable space systems.[118] This form of attack is inexpensive but requires significant human resources to carry out.

Furthermore, the dual-use nature of space assets means that states with certain space capabilities, particularly space launch capabilities, will also possess certain attack technologies. A state that can launch a satellite into space could, with certain modifications, launch a warhead almost anywhere in the world. The launch of space assets by the Islamic Republic of Iran and the Democratic People's Republic of Korea, for example, were met with concern that the respective civilian space programmes are pretext for the development of ballistic missile technology.[119] At present, there are no means of verifying the intentions behind space activities, making space technology a source of suspicion between rival states. Given that there is still limited communication among states regarding strategic space policies, there is real concern that outer space activities could be a trigger for conflict through misperception or miscommunication.

These factors, coupled with pre-existing security tensions in Eurasia, have contributed to the growing fear that armed conflict will inevitably spread into outer space, just as it has through land, sea, and air. Having seen the value of space-based services for social, economic, and defence purposes, policymakers are seeking multilateral options that could meaningfully reduce the tensions created by space technology. These include a variety of diplomatic, legal, and political tools, particularly the development of norms of behaviour for outer space activities.

## WHY NORMS OF BEHAVIOUR?

Current international space law prohibits the placement of nuclear weapons or weapons of mass destruction in outer space or on the Moon or other celestial bodies, but it is silent on the placement of other types of weapons in outer space. Since the early 1980s, international policymakers and key stakeholders in the international community have recognized this gap and called on the Conference on Disarmament (CD), a multilateral disarmament negotiating forum of the international community, to take up discussions on a treaty for the prevention of the placement of weapons in outer space within an agenda item entitled the prevention of an arms race in outer space (PAROS).[120] However, due to a number of diplomatic hurdles—including a debate over whether an arms race even exists in space and whether it should be addressed at all—the CD has been unable to make progress. In 2008, the Russian Federation and China submitted a proposal to the CD on 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), but similar hurdles have led to a lack of progress on this proposal.[121] In this context, the development of legal solutions to mitigate the potential outbreak of armed conflict in outer space has proven particularly slow, while the development and proliferation of space arms and technology have continued.

117 E. Lavan, "Satellite interference: an operator's perspective", presented at the International Telecommunication Union satellite communication workshop, Geneva, 10 June 2013; H. Foy, "Eutelsat adopts anti-jamming tech in upcoming satellite", *Space Safety Magazine*, 21 February 2013.

118 N. Blake Johnson, "Report: cyber attacks targeted U.S. satellites", *Defense News*, 28 October 2011.

119 A. Lele, *A Missile in the Monkey's Shadow?*, Institute for Defense Studies and Analyses, 31 January 2013; J. Johnson-Freese, "Is North Korea testing the Sino-US relationship with missiles?", *China-US Focus*, 17December 2012.

120 Federation of American Scientists, "Prevention of an arms race in outer space".

121 Reaching Critical Will, "Outer space: militarization, weaponization, and the prevention of an arms race".

Given the difficulties that have been faced in addressing the issue of an arms race in outer space, some policymakers have once again turned to the establishment of voluntary norms of behaviour in order to mitigate the possibility of armed conflict while more comprehensive solutions are found.[122] Rather than relying on legal agreements for parties to behave in a particular manner, these norms are dependent on political pressure for adherence. Such approaches have seen some success in the past with particularly dangerous forms of technology, including the International Code of Conduct against Ballistic Missile Proliferation, a voluntary political agreement under which states undertake to mitigate the effects of ballistic missile proliferation by providing pre-launch notifications of ballistic missiles and space launch vehicles.[123] This instrument received notable support from a number of Eurasian states, including Afghanistan, Kazakhstan, the Russian Federation, and Ukraine. However, the lack of engagement with the initiative on the part of key states—such as India and Pakistan—is a reminder that non-legally binding instruments must have broad support in order to be effective.

Recently, significant efforts have been proposed to establish norms that are designed to help ensure strategic stability in outer space by promoting transparency and confidence among states, namely TCBMs. The objectives behind these TCBMS include arms limitation/disarmament, reduction of international tensions, and the reduction in the possibility of misunderstanding and mistrust with regard to a state's space policies and intentions.[124] The usefulness of such types of measures was evident throughout the Cold War, when informal tools helped to reduce the risk of nuclear strikes between the Soviet Union and the United States.[125] While TCBMs could also come in the form of formal legal instruments, such as those contained in the draft PPWT, several initiatives have been put forward to use voluntary political measures to establish norms of behaviour as a means of promoting transparency and confidence.

One initiative comes in the form of the United Nations Group of Governmental Experts on TCBMs in Outer Space Activities (GGE), a group organized by the Secretary-General of the United Nations at the request of the First Committee of the General Assembly. The GGE prepared a report that contains recommendations on TCBMs for improving international cooperation and reducing the risk of miscalculation or miscommunication related to space activities.[126] The GGE was formed on the basis of equitable geographical representation, with a number of Eurasian states represented, namely the Russian Federation (as Chair), Kazakhstan, Romania, Sri Lanka, and Ukraine.

Another initiative is the European Union's proposed International Code of Conduct for Outer Space Activities (ICoC). While not containing any direct references to arms control or the weaponization of outer space, the ICoC does include several measures on notification of space activities, data/information exchange, and consultation mechanisms[127] The first of the open-ended consultations on the ICoC was held in Kiev, Ukraine in May 2013 and a second meeting was held in Bangkok, Thailand in November 2013. Both of these initiatives have been well received, though some space actors still doubt whether voluntary measures will be sufficient to prevent an arms race in outer space without the implementation of a formal legal instrument.[128]

122 Statement of the European Union on PAROS, Conference on Disarmament, Geneva, 19 March 2013.
123 A Brief Overview of Norms Development in Outer Space, UNIDIR, 2012, p. 6.
124 V. Vasiliev, "UN Group of Governmental Experts on TCBMs for Outer Space Activities", presented at the UNIDIR Space Security Conference 2013, Geneva, 2–3 April 2013.
125 Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, UN document A768/189, par. 22.
126 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space*, UN Document A/68/189, 29 July 2013.
127 Part III of the draft ICoC, presented at the multilateral meeting held in Vienna on 5 June 2012.
128 Statement by Indonesia on behalf of the Non-Aligned Movement at the thematic debate of the First Committee (22 October 2012); M.A. Jáquez, "La carrera armamentista en el espacio ultraterrestre y la Conferencia de Desarme de las Naciones Unidas", presented at the UNIDIR seminar Space Equities: The Role of the Americas in Building Norms of Behaviour, Mexico City, 2–3 July 2013.

One other initiative that should be mentioned is a no-first-placement pledge. This is a unilateral effort by the Russian Federation, which in 2004 pledged not to be the first state to place weapons in outer space. This is an effort to set an example against the deployment of weapons in space, potentially establishing a norm of behaviour.[129]

## NORMS OF BEHAVIOUR AND SPACE SECURITY DILEMMAS

While it is not possible to determine the precise motivations behind many of the actions that are unfolding in Eurasia, there are several common interests that would indicate that none of the actors discussed are eager to engage in an arms race in outer space. The Russian Federation has already shown its desire to avoid conflict in space by committing not to be the first to place weapons in outer space, not least of all because, as a leader in space activities, it has much to lose if conflict erupts in outer space. India, likewise, is increasingly dependent on space activities and has been seeking space-related arms largely as a deterrent against perceived threats. States such as Pakistan have not developed dedicated military space programmes but have the resources to do so should it be deemed necessary.

In this context, norms of behaviour, and TCBMs in particular, could usefully serve to mitigate mistrust among states by offering small, measured steps towards openness and transparency. The political flexibility of voluntary norms means that states do not have to meet all standards and obligations at once, but can come into compliance at a measured pace. For states in tense security situations, such as India and the Russian Federation, this would offer a gradual scaling down of armaments and tension, as opposed to a sudden drop in defences. The adoption of voluntary norms also does not preclude the adoption of formal instruments, so TCBMs can be seen as an intermediate measure taken as more formal, legal solutions are negotiated, such as the PPWT.

The downside of adopting voluntary measures is that they must be enacted at the national level and will, therefore, require the support of states that presently feel threatened. Without the support of major players such as India and the Russian Federation, the effectiveness of norms will be limited. It is therefore up to those involved in the drafting of the proposed norms of behaviour to find TCBMs that will achieve the desired objective of reducing tensions and the risk of miscommunication in a manner consistent with the national security objectives of the major players.

## CONCLUSIONS

As space activities increase, the need for a normative framework to mitigate the man-made threats to space security is becoming apparent. Rules that address potential collisions and accidental harmful interference are being explored at the multilateral level in order to ensure the long-term sustainability of space activities. However, rules will also be required to mitigate the impact of space technology on existing and future security tensions around the world. The need for such rules is particularly apparent in Eurasia, where the socioeconomic and geopolitical interests of a number of key space powers are colliding. Concerns over the integrity of critical space assets, combined with the proliferation of space-based weapons technology, have contributed to increased tensions among actors such as China, India, the Russian Federation, and the United States. The actions of these four in outer space could have destabilizing effects on the space domain, particularly if this tension should evolve into hostilities either on Earth or in outer space. The latter possibility could make the most useful but limited orbits prohibitively hostile for space assets. For other space actors in Eurasia, such as Ukraine and Kazakhstan, the spread of armed conflict into space could deprive them of critical services as well as deny a useful resource for economic prosperity.

129 A. Yakovenko, "Why Russia is against weapons in space", *RT*, 3 April 2013.

Several options have been put forward by international policymakers to mitigate the impacts of space technology on global and space security. While efforts to develop a legally binding instrument have been met with considerable hurdles, voluntary norms of behaviour have emerged as a non-legally binding alternative. In particular, TCBMs may be useful in promoting confidence among potential rivals and lowering tensions over the use and development of space capabilities. The success of norms in the past has encouraged policymakers to seek a number of parallel multilateral initiatives to develop TCBMs, including the GGE and the ICoC. However, in order to achieve the necessary support for these tools to have a meaningful impact on the state of space security, widespread support will be needed from current and future space actors. This could be particularly difficult to accomplish among Eurasian states, which might find that norms limit their strategic options. It will be up to the policymakers involved in these processes to ensure that the resulting norms are seen as being complementary to national security policies throughout the region. Widespread participation by the international community could play a critical role towards this end.

# A BRIEF OVERVIEW OF NORMS DEVELOPMENT IN OUTER SPACE

## INTRODUCTION

The use of norms of behaviour as a tool for managing the security of the outer space domain and the space activities of states is not a new concept. Since the beginning of the space age and the multilateralization of the regulation of space activities, norms of behaviour have played a key role in building the foundation for near-term improvement in stability and the coordination of day-to-day space activities and long-term progress in establishing a durable space security regime at the multilateral level.

In brief, norms of behaviour can be described as voluntary "rules of the road" that can set baseline standards of conduct intended to mitigate threats to safety, security, and stability in outer space. Historically, norms have provided flexible solutions in cases where there has been political will to address certain types of behaviour and conduct, such as in the use of landmines and cluster bombs, but where diplomatic and political hurdles have made the development of legal instruments impractical. However, it should be noted that the voluntary nature of adherence means that the framework itself will depend entirely on the broad support of stakeholders in order to generate the necessary social and political pressure needed for effective implementation.

In light of current multilateral efforts to develop new norms and associated frameworks for outer space activities, this paper provides a brief overview of previous space-related norms of behaviour initiatives and a brief assessment of their efficacy.

## NORMS OF BEHAVIOUR AS APPLIED TO OUTER SPACE ACTIVITIES

### The first declaration of norms in outer space

Not long after the launch of Sputnik in 1957, an international declaration on outer space activities was adopted in the form of a United Nations General Assembly resolution as the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (the Declaration of Legal Principles).[130] The declaration was not legally binding, but rather represented a collective affirmation of the guiding principles to which Member States proposed to adhere. Already at this early stage of multilateral space interaction, states were using political tools to create pressure for certain types of behaviour in space. The Declaration of Legal Principles commanded so much widespread support that, just five years later, the principles of the declaration were formalized by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) into the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies (the Outer Space Treaty), the instrument which is considered to form the basis of outer space law.[131]

The adoption of the Outer Space Treaty marked the beginning of a period that saw a significant amount of political will aimed at the adoption of formal legal instruments.[132] The next few decades saw the adoption of four more treaties that dealt with specific aspects of outer space

130 General Assembly, *Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space*, UN document resolution 1962 (XVIII), 13 December 1963.

131 S. Hobe, "Historical background", in S. Hobe, B. Schmidt-Tedd, and K.-U. Schrogl (eds.), *Cologne Commentary on Space Law, Volume 1: Outer Space Treaty*, 2009, p. 16.

132 V. Kopal, "The role of United Nations declarations of principles in the progressive development of space law", *Journal of Space Law*, vol. 16, no. 1, 1988, p. 10.

activities, although each received less and less support from the international community.[133] The last formal space treaty to be adopted by COPUOS was the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, which has only 15 parties, while the Outer Space Treaty has 102 parties.

Since the adoption of these instruments, the politics of space have significantly evolved. Cold War divisions no longer dominate, new actors with developmental rather than prestige- and security-related motivations are entering the domain, and states are now treating space as a cross-sectoral domain encompassing civil, military, commercial, and development aspects. As such, the balance of power in outer space has shifted significantly. This has resulted in little to no progress being made on the development of formal legal instruments intended to update the existing outer space legal regime.[134] Looking at the adoption of the first non-binding declarations on norms for outer space to their eventual metamorphosis into the Outer Space Treaty may prove instructive for future initiatives.

#### Principles governing direct television broadcasting

When the first satellite began to transmit radio signals back to Earth, space activities were greatly influenced by Cold War tensions. Concerns over propaganda and state sovereignty left many wondering whether broadcast signals were a threat to internal national affairs.[135] Finding that the Outer Space Treaty did not directly address direct broadcasting by satellite, a number of initiatives sought to address the legal and political questions that arose from direct broadcasting by satellite.[136] Not long after the adoption of the Outer Space Treaty, the United Nations General Assembly was considering the possibility of elaborating principles to govern direct broadcasting by satellite with a view to concluding an international agreement.[137]

Two pre-existing initiatives were used as foundations for this effort. First, the 1971 Technical Restrictions of International Direct Television Broadcasting (Radio Regulation 428A) were adopted by the World Administrative Radio Conference. This regulation was intended to address the problem of signals being broadcast by one state spilling into another state and the coordination of radio frequencies through registration. The following year, the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the Declaration on the Use of Satellite Broadcasting for the Free Flow of Information, which was intended to act as non-binding principles to govern satellite broadcasting and serve as the basis for further negotiations.[138]

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133 The Outer Space Treaty presently has 102 parties; the 1967 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space has 92 parties; the 1972 Convention on International Liability for Damage Caused by Space Objects has 89 parties; the 1976 Convention on Registration of Objects Launched into Outer Space has 60 parties; and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies has 15 parties. See United Nations Office for Outer Space Affairs, "Status of international agreements relating to activities in outer space", www.unoosa.org/oosa/en/SpaceLaw/treatystatus/index.html.

134 S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 57–58; also G. Singh, "PPWT: an overview", in A. Lele (ed.), *Decoding the International Code of Conduct for Outer Space Activities*, 2012, pp. 47–48.

135 S. Schmahl, "The United Nations facing the challenges of the 'information society'", in A. von Bogdandy and R. Wolfrum, *Max Planck Yearbook of United Nations Law*, vol. 11, 2007, p. 202. F. Koppensteiner, "The 1982 UN Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 161–162.

136 V. Kopal, "The role of United Nations declarations of principles in the progressive development of space law", *Journal of Space Law*, vol. 16, no. 1, 1988, p. 12.

137 General Assembly, *Report of the Working Group on Direct Broadcast Satellites at its Third Session*, UN document A/AC.105/83, 25 May 1970, p. 11.

138 Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange, 15 November 1972.

During this period, a number of proposed conventions were also submitted to COPUOS intended to establish comprehensive guidelines for direct broadcasting by satellite.[139] To elaborate and discuss these proposals, a working group of the COPUOS Legal Subcommittee was established. Many of the participants of this work were encouraged by the fact that, when discussions opened, there was near consensus on many of the objectives of the envisaged principles.[140] However, it proved impossible to reconcile positions on several issues, including obligations for state consultations, the seeking of prior consent for broadcasting into a foreign state, state responsibility for all broadcast activities, and the applicability of the principles to international law. The divisions reflected the views and priorities of two distinct groups of states: those most interested in preserving the free flow of information and those seeking to protect state sovereignty. Despite best efforts to reconcile these views, COPUOS members were unable to reach consensus on a text. Nevertheless, the proposed Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (Principles on Direct Broadcasting by Satellite) were adopted in 1982 by the General Assembly.[141]

In assessing the success of the Principles on Direct Broadcasting by Satellite, it is important to bear in mind that the strength of non-binding instruments can be measured by existing support as well as any initiatives that might emerge therefrom. In the case of the Principles on Direct Broadcasting by Satellite, consensus could not be reached for adoption and few states have complied with its principles.[142] Nevertheless, many agree that, where more work needs to be done, the Principles might usefully serve as a starting point from which to address today's economic and social needs.[143]

### Principles relating to remote sensing of the Earth from outer space

The emergence of satellites capable of producing data of activity on Earth (that is, remote sensing) raised a host of political and legal issues in the international community. Given that all countries can be sensed from outer space, many states raised concerns at an early stage regarding who could use remote sensing technology, what could be done with the data, who had access to the data, and what, if any, were the rights of those who were being sensed.[144] States also recognized the potential social and economic benefits that could be derived from this technology and sought to establish common principles that could offer guidance for the development of national and international policies on remote sensing.[145] Negotiations on a

139 F. Koppensteiner, "The 1982 UN Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 162, 165–167.

140 V. Kopal, "The role of United Nations declarations of principles in the progressive development of space law", *Journal of Space Law*, vol. 16, no. 1, 1988, p. 12.

141 F. Koppensteiner, "The 1982 UN Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 170–171; also V. Kopal, "The role of United Nations declarations of principles in the progressive development of space law", *Journal of Space Law*, vol. 16, no. 1, 1988, p. 12.

142 S. Schmahl, "The United Nations facing the challenges of the 'information society'", in A. von Bogdandy and R. Wolfrum, *Max Planck Yearbook of United Nations Law*, vol. 11, 2007, p. 205; F. Koppensteiner, "The 1982 UN Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 171–180; and V. Kopal, "The role of United Nations declarations of principles in the progressive development of space law", *Journal of Space Law*, vol. 16, no. 1, 1988, pp. 12–14.

143 F. Koppensteiner, "The 1982 UN Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 181; Y.M. Kolossov, "Prospect for an international treaty on telecommunications", *California Western Law Review*, vol. 27, no. 1, 1990–1991, p. 177; S. Schmahl, "The United Nations facing the challenges of the 'information society'", in A. von Bogdandy and R. Wolfrum, *Max Planck Yearbook of United Nations Law*, vol. 11, 2007, pp. 229–230.

144 H. Desaussure, "Remote sensing satellite regulation by national and international law", *Rutgers Computer and Tech Law Journal*, vol. 15, no. 1, 1989, p. 353.

145 C. Uriarte Vega, *Remote Sensing Policy and Law*, 2007, p. 12.

formal instrument to govern remote sensing activities proved difficult particularly because the interests of states with remote sensing capabilities were quite distinct from those that did not have such capabilities.[146] Being unable to resolve certain key questions, such as those mentioned above, COPUOS adopted a broad set of general principles that all states could agree on—the 1986 Principles Relating to Remote Sensing of the Earth from Outer Space (the Remote Sensing Principles).

The Remote Sensing Principles "establish general regulatory norms of conduct" for those remote sensing activities that relate to natural resource management, land use, and the protection of the environment. They also lay out certain duties for states that are conducting sensing activities as well as the rights of those states that are being sensed. These include the duty to consult with states being sensed as well as an obligation to share data with sensed states on a non-discriminatory basis.[147] Due to political complexities, the Remote Sensing Principles refrain from addressing certain legal questions, such as whether a state has a proprietary right to images of its own natural resources.[148] The restricted language also means that the provisions of the principles will need to be amended in order to take into account the emergence of new technological capabilities, such as long-term Earth monitoring.[149]

The Remote Sensing Principles are seen as being a particularly useful as a first step in the establishment of a wider range of tools and cooperative measures. For example, the provisions in the Remote Sensing Principles on "protection of the Earth's environment" and "protection of mankind from all natural disasters" have led to the adoption of the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, an instrument aimed at providing a unified system of data acquisition and delivery to those affected by natural or manmade disasters.[150] The Remote Sensing Principles have also been incorporated into numerous national, regional, and multilateral laws and policies, including those of France, Japan, India, Thailand, and the United States of America.[151] Such developments demonstrate the potential value of such norms in building subsequent national and international frameworks and for informing development of national space activities and regulation.

### The principles and safety framework for the use of nuclear power sources in outer space

Another category of space activities that has been addressed through the establishment of norms of behaviour is the use of nuclear power sources in space assets. Such power sources are mainly used to power probes bound for deep space exploration, though they are sometimes used on space assets placed in Earth orbit.[152] The potential threat of radiation leaking from one of these devices and complications regarding the end-of-life and disposal phases of a mission of such assets caused significant concern among the international community. This led to the adoption of two voluntary tools for the establishment of norms of behaviour for the responsible use of nuclear power sources.

The first initiative involved the adoption of the United Nations Principles Relevant to the Use of Nuclear Power Sources in Outer Space (Principles on Nuclear Power Sources). These Principles

146 Ibid., pp. 12–21.
147 F. von der Dunk, "United Nations principles on remote sensing and the user", 2002, pp. 36–37, 39–40; and J.I. Gabrynowicz, "The UN principles relating to remote sensing of the Earth", in I. Marboe (ed.), Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law, 2012, pp. 189.
148 H. Desaussure, "Remote sensing satellite regulation by national and international law", 15 Rutgers Computer and Tech Law Journal, vol. 15, no. 1, 1989, pp. 357, 374.
149 J.I. Gabrynowicz, "The UN principles relating to remote sensing of the Earth", in I. Marboe (ed.), Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law, 2012, p. 190.
150 Ibid., p. 191.
151 Ibid., pp. 189–190.
152 COPUOS and the International Atomic Energy Agency, *Safety Framework for Nuclear Power Source Applications in Outer Space*, 2009, § 1.1; see also F. Lyall and P.B. Larsen, *Space Law: A Treatise*, 2009, p. 293.

are intended to provide voluntary guidelines to ensure the safe use of nuclear power sources in outer space. They were first tabled in 1978 before COPUOS following the re-entry of a satellite carrying a nuclear power source over Canada.[153] Throughout the ensuing discussions, concerns were raised that these new Principles might inhibit the development of new technology, particularly for propulsion.[154] As a result, following a lengthy negotiation process, the final text of the Principles was narrowly drawn to cover only nuclear power sources used for the generation of electrical power for non-propulsion purposes. In light of the relatively few such missions that have been carried out since adoption of the Principles on Nuclear Power Sources, the drawing of any conclusions is still premature.[155] Nevertheless, a case can be made for the efficacy of the Principles as they served as the foundation for an additional framework for nuclear power source-related activities.

The second set of norms dealing with nuclear power sources is a product of a collaborative effort between the COPUOS Scientific and Technical Subcommittee and the International Atomic Energy Agency (IAEA)—the Safety Framework for Nuclear Power Source Applications in Outer Space (the Nuclear Power Source Framework). The Framework was developed to give high-level guidance that provided for both the programmatic and technical aspects of safety, including the design and application of space nuclear power sources.[156] The Nuclear Power Source Framework is a set of non-binding guidelines based on best-practice measures developed by the Soviet Union and the United States of America, the two states with the most experience in nuclear power source activities.[157]

As with the case of the Principles on Nuclear Power Sources, few instances have arisen in which the Framework applies, so it is difficult to gauge its effectiveness. Nevertheless, technical experts consider the Framework to be a strong foundation for national policies and standards and have encouraged its use as the foundation for any future international initiatives on this type of activity.[158]

### The Declaration on Exploration of Outer Space for the Benefit of All States

One of the pillars of the Outer Space Treaty is the principle that "the exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind" (art. I). This has proven to be an ambitious statement whose component terms remain largely undefined, such as the concept of the "distribution of benefits to all states".[159] Since the adoption of the Outer Space Treaty, two dominant points of

153 See "Settlement of claim between Canada and the Union of Soviet Socialist Republics for damage caused by 'Cosmos 954' (Released on April 2, 1981)", www.jaxa.jp/library/space_law/chapter_3/3-2-2-1_e.html.

154 D.A. Porras, "The United Nations Principles on the Use of Nuclear Power Sources in Outer Space: the significance of a soft law instrument after nearly 20 years in force", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 210.

155 See "Notifications by Member States of safety assessments carried out for nuclear-powered space objects", www.oosa.unvienna.org/oosa/natact/sdnps/nps-safety.html.

156 COPUOS and the IAEA, *Safety Framework for Nuclear Power Source Applications in Outer Space*, 2009, § 1.3; see also L. Summerer and U.M. Bohlmann, "The STSC/IAEA Safety Framework for Space Nuclear Power Source Applications", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 231.

157 L. Summerer and U.M. Bohlmann, "The STSC/IAEA Safety Framework for Space Nuclear Power Source Applications", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 261–265; see also D.A. Porras, "The United Nations Principles on the Use of Nuclear Power Sources in Outer Space: the significance of a soft law instrument after nearly 20 years in force", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 227–232.

158 L. Summerer and U.M. Bohlmann, "The STSC/IAEA Safety Framework for Space Nuclear Power Source Applications", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 261–265.

159 G. Hafner, "The Declaration of International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-*

view have emerged on this issue: on the one hand, some states see no specific obligation to cooperate, while on the other hand, others see an obligation for space-faring states to ensure all states benefit from space use and exploitation.[160] In order to give some guidance on what might be considered the "duty of cooperation", the United Nations General Assembly adopted the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (the Declaration on Cooperation).[161]

During the course of negotiations within COPUOS to adopt the Declaration on Cooperation, a number of states expressed concerns over the creation of affirmative duties to cooperate or transfer technology and expertise.[162] The resulting text was, therefore, crafted so as not create any new duties, but reiterated pre-existing norms and left states free to determine the level of participation and cooperation with one another.[163] It has served as the impetus for numerous cooperative initiatives, for example by regional space organizations in South-East Asia and in the Americas.[164] The Declaration on Cooperation is seen as an affirmative step to steer state behaviour in a particular direction, in this case towards greater cooperative efforts.[165] Such efforts have played a significant role in raising awareness about the potential of space-based services, encouraging new actors to enter the space domain and helping inform and direct their approaches to space activities. Norms of this type may play a key role in influencing the behaviour of new entrants.

### Space Debris Mitigation Guidelines

As discussed above, space debris has emerged as one of the most significant threats for space assets. Finding that a number of national space agencies had developed similar measures to address this issue, the Inter-Agency Space Debris Coordination Committee (IADC)[166] formulated the IADC Space Debris Mitigation Guidelines, based on the best practices employed by members. These were submitted to the COPUOS Scientific and Technical Subcommittee, where the comments of states were considered and incorporated into an updated draft text. COPUOS endorsed this revised text in 2007, agreeing that the "guidelines would increase mutual understanding on acceptable activities in space and thus enhance stability in space-related matters and decrease the likelihood of friction and conflict".[167] The General Assembly

*Binding Norms in International Space Law*, 2012, p. 268.

160 Ibid.

161 General Assembly, *Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries*, UN document A/RES/51/122, 13 December 1996.

162 G. Hafner, "The Declaration of International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 269–271.

163 R. Jakhu, "United Nations Principles on Outer Space", www.oosa.unvienna.org/pdf/sap/2005/nigeria/presentations/01-03_2.pdf, p. 10.

164 N. Peter, "The changing geopolitics of space activities", *Space Policy*, vol. 22, no. 2, 2006, p. 107.

165 G. Hafner, "The Declaration of International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 287.

166 Originally founded in 1993, the current members of the IADC are Agenzia Spaziale Italiana, Centre National d'Etudes Spatiales, China National Space Administration, Canadian Space Agency, German Aerospace Center, European Space Agency, Indian Space Research Organisation, Japan Aerospace Exploration Agency, US National Aeronautics and Space Administration, State Space Agency of Ukraine, Russian Federal Space Agency, and UK Space Agency.

167 General Assembly, *Report of the Committee on the Peaceful Uses of Outer Space*, UN document A/62/20), 2007, paras. 118–119; see also S. Aoki, "The function of 'soft law' in the development of international space law", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 75–76.

also endorsed the Guidelines, inviting Member States to implement them through their own national mechanisms.[168]

The Guidelines provide voluntary technical guidance for United Nations Member States that might be "considered during planning and design of spacecraft and launch vehicles in order to minimise or eliminate generation of debris during operations".[169] Under the terms of application, the Guidelines state that "Member States and international organizations should take voluntary measures, through national mechanisms or through their own applicable mechanisms" to prevent the creation of space debris during all mission phases, from the manufacturing and operational phases, including launch, mission and disposal of the space asset.[170]

Some states, including France, Germany, Italy, Japan, the United Kingdom, and the United States, have formally announced incorporation of the Guidelines into domestic licensing requirements for space operations.[171] However, the Guidelines have served as benchmarks for standards adopted by numerous national space agencies, such as of China and Malaysia, and have served as the basis for further development of debris mitigation measures.[172] One analyst noted that, because of the observable deterioration of the space environment and mankind's increased dependence on it, "wider endorsement of the mitigation guidelines is just a matter of time".[173]

### Hague Code of Conduct against Ballistic Missile Proliferation

One example of the development of norms beyond the ambit of the United Nations is the International Code of Conduct against Ballistic Missile Proliferation, which "seeks to bolster efforts against the worldwide proliferation of ballistic missiles by agreeing on a set of general principles and commitments, amplified by modest confidence-building measures".[174] This tool was adopted as a means of addressing a gap in the non-proliferation framework, namely the development, testing, and deployment of ballistic missiles.[175] Owing to the dual-use nature of rockets, this tool also applies to the use of space launch vehicles. In particular, the Hague Code of Conduct's members "voluntarily commit themselves politically to provide pre-launch notifications … on ballistic missile and space-launch vehicle launches … and test flights", as well as to submit an annual declaration of policies on ballistic missiles and space-launch vehicles.[176]

The first draft of the Hague Code of Conduct was put forward in 2000 by partners of the Missile Technology Control Regime (MTCR)[177] as a means of establishing modest guidelines under which

168 General Assembly, *International Cooperation in the Peaceful Uses of Outer Space*, UN document A/RES/62/217*, 1 February 2008; see also F. von der Dunk, "Contradictio in terminis or realpolitik? A qualified plea for a role of 'soft law' in the context of space activities", in I. Marboe (ed.), Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law, 2012, pp. 54–55.

169 IADC Space Debris Mitigation Guidelines, document IADC-02-01, 15 October 2002, p. iii.

170 See chps. 3 and 4 of the IADC Space Debris Mitigation Guidelines.

171 General Assembly, *Report of the Scientific and Technical Subcommittee on its Forty-Second Session, Held in Vienna from 21 February to 4 March 2005*, UN document A/AC.105/848, 25 February 2005, para. 91; see also M. Listner, "Legal issues surrounding space debris remediation", *The Space Review*, 6 August 2012; and F. von der Dunk, "Contradictio in terminis or realpolitik? A qualified plea for a role of 'soft law' in the context of space activities", in I. Marboe (ed.), Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law, 2012, pp. 54–55.

172 L. Viikari, *The Environmental Element in Space Law: Assessing the Present and Charting the Future*, 2008, pp. 96–97.

173 J. Su, "The environmental dimension of space arms control", Space Policy, vol. 29, no. 1, 2013, § 3.3.

174 D. Gormley, "Making the Hague Code of Conduct relevant", Nuclear Threat Initiative, 20 July 2009, www.nti.org/analysis/articles/making-code-conduct-relevant/.

175 P. Kerr, "Code of Conduct aims to stop ballistic missile proliferation", *Arms Control Today*, January/February 2003, www.armscontrol.org/act/2003_01-02/icoc_janfeb03.

176 See Austrian Foreign Ministry, "Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)", www.bmeia.gv.at/index.php?id=64664&L=1.

177 The MTCR is a voluntary association whose members promote non-proliferation of unmanned delivery systems for weapons of mass destruction through national export controls; US Department of State, "Hague Code of Conduct Against Ballistic Missile Proliferation (HCOC)", www.state.gov/t/isn/trty/101466.htm.

states would commit to exercising maximum possible restraint in the development, testing, and deployment of ballistic missiles capable of delivering weapons of mass destruction.[178] This would also cover space-launch vehicles which, by virtue of their technical nature, could also be used to deliver such weapons. As had been seen during the development of the MTCR, this was a topic in which diverse views were difficult to reconcile due to the role of ballistic missiles in national defence programmes.[179] In addition, a number of key states, such as Brazil, India, and South Africa, had expressed concern that the Hague Code of Conduct might interfere or limit the legitimate aspirations of states to develop peaceful space technologies such as space launch vehicles.[180] The resulting text, therefore, makes a distinction between ballistic missiles and space launch vehicle. Nevertheless, a number of states opted not to participate in the negotiation process, citing this issue as one of its central objections.[181]

Despite the misgivings of some states, the Hague Code of Conduct is seen as another positive step in the process for establishing concrete global non-proliferation norms, as evidenced by the notable growth of its membership from the original 93 members to 134 (the MTCR has only 34 members).[182] The United Nations General Assembly welcomed the adoption of the Hague Code of Conduct and has continued to support the ongoing process for the Code's implementation. However, some have criticized the utility of this framework because of some states' failure to fully implement the Code, as well as the absence of several key states from the list of signatories.[183] This underlines the extent of the reach of such types of norms as, in that they are non-legally binding documents, there is no obligation created and thus there is potentially a higher chance for weak adherence.

## ONGOING MULTILATERAL INITIATIVES TO DEVELOP NORMS OF BEHAVIOUR

At present, there are a number of ongoing initiatives that seek to establish non-legally binding norms of behaviour similar to those described above. It is particularly interesting that, unlike many of the previous instruments that sought to regulate very narrowly defined categories of behaviour, these initiatives cover a range of general activities in outer space.

### The United Nations Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities

The Group of Governmental Experts (GGE) is an initiative originating in the United Nations General Assembly First Committee, which deals with disarmament, global challenges, and

178 See Nuclear Threat Initiative , "Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)", www.nti.org/treaties-and-regimes/hague-code-conduct-against-ballistic-missile-proliferation-hcoc/.

179 W. Pal Singh Sidhu, "Looking back: the Missile Technology Control Regime", *Arms Control Today*, April 2007, www.armscontrol.org/act/2007_04/LOOKINGBACK; see also M. Smith, "Pragmatic Micawberism? Norm construction on ballistic missiles", *Contemporary Security Policy*, vol. 27, no. 3, 2006, p. 526; and D. Gormley, "Making the Hague Code of Conduct relevant", Nuclear Threat Initiative, 20 July 2009, www.nti.org/analysis/articles/making-code-conduct-relevant/.

180 M. Smith, "Stuck on the launch pad? The ballistic missile code of conduct opens for business", *Disarmament Diplomacy*, no. 68, 2003.

181 Ibid.

182 M. Smith, "Pragmatic Micawberism? Norm construction on ballistic missiles", *Contemporary Security Policy*, vol. 27, no. 3, 2006, p. 536–537; see also A. Lele, "The Hague Code of Conduct: predicting the future", Society for the Study of Peace and Conflict, 15 January 2013, www.sspconline.org/opinion/HagueCodeofConduct_PredictingtheFuture_15012013; *Weapons of Terror: Freeing the World of Nuclear, Biological and Chemical Arms*, Weapons of Mass Destruction Commission, 2006; D. Gormley, "Making the Hague Code of Conduct relevant", Nuclear Threat Initiative, 20 July 2009, www.nti.org/analysis/articles/making-code-conduct-relevant/; US Department of State, "Tenth anniversary of the Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)", media note, 12 November 2012; and "The Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)", www.hcoc.at/index.php.

183 See General Assembly, *The Hague Code of Conduct against Ballistic Missile Proliferation*, UN document A/RES/59/91, 17 December 2004; and General Assembly, *The Hague Code of Conduct against Ballistic Missile Proliferation*, UN document A/RES/67/42, 4 January 2013.

threats to peace and security that affect the international community, and seeks out solutions to the challenges in the international security regime. The GGE is intended to help improve transparency in space and reduce the risk of misunderstandings and miscommunications among outer space actors.[184] The GGE's goal is to produce a consensus report that will outline recommendations for the strengthening of safety and security in outer space and may lay the basis for the development of future frameworks and norms of behaviour for space activities. This work is scheduled to be completed in 2013 when the GGE presents its report to the First Committee.

### COPUOS Working Group on Long-Term Sustainability of Space Activities

In the context of COPUOS, the Working Group on long-term sustainability of space activities is presently engaged "to examine and propose measures to ensure the safe and sustainable use of outer space for peaceful purposes, for the benefit of all countries".[185] This Working Group is divided into four subgroups, which cover space utilization, space debris, space weather, and regulatory regimes. Much like the Nuclear Power Source Framework, these measures will be technical in nature, but with sufficient flexibility so that policymakers and key stakeholders will be able to adapt them to ongoing as well as new operations. The Working Group intends to introduce a first draft of its recommended measures in 2014.

### International Code of Conduct for Outer Space Activities

An International Code of Conduct for Outer Space Activities has recently been tabled by the European Union. This initiative is intended to "enhance the security, safety and sustainability of all outer space activities"[186] by encouraging responsible behaviour in space by developing best-practice guidelines. This initiative is based on three principles: freedom for all to use outer space for peaceful purposes, preservation of the security and integrity of space objects in orbit, and due consideration for the legitimate security and defence needs of states. The European Union has carried open-ended consultations, inviting as wide a range of states as possible to submit comments with the aim of achieving a text that will command widespread support. The EU hopes to entering negotiations on the text of the code in the near future. This initiative is unique in that it seeks to address space activities in a comprehensive framework, addressing both civil and security space issues.[187]

## CONCLUSION

In the context of outer space, norms of behaviour are useful tools that can help define the parameters of responsible behaviour, support existing international regimes, and give guidance to key stakeholders as they develop their own space programmes. The examples cited in this paper illustrate how norms can, for example, provide technical guidance for specific hazardous activities, such as the Nuclear Power Source Principles and Framework. They also illustrate how norms have served as intermediary steps in an ongoing process to find solutions to legal, technical, and political issues in space.

184 General Assembly, *Transparency and Confidence-Building Measures in Outer Space Activities*, UN document A/RES/63/68, 12 January 2009.

185 P. Martinez, Chair of the Working Group, "The role of COPUOS in promoting sustainability of outer space", presented at the UNIDIR seminar "The role of norms of behaviour for African Space Activities", Addis Ababa, 7–8 March 2013.

186 Revised draft International Code of Conduct for Outer Space Activities, art. 1.1, www.consilium.europa.eu/media/1696642/12_06_05_coc_space_eu_revised_draft_working__document.pdf.

187 European Union, "EU Statement—United Nations First Committee: outer space", 22 October 2012, paras. 10, 12, www.eu-un.europa.eu/articles/en/article_12753_en.htm.

# NORMS OF BEHAVIOUR, BARRIERS TO ENTRY?

## INTRODUCTION

During the early stages of space exploration, the world watched as two superpowers pushed the limits of what was considered to be within the realm of human achievement. Satellites and spacecraft circled the Earth from far beyond the atmosphere, providing us with a new perspective of life on the surface. This has changed the way we approach social, economic, and security challenges, and given us new tools to do so. Today, more than 60 states of varying degrees of technological, economic and political development are conducting space activities at some level, and all indications suggest that this number will only continue to grow.

Some of the side effects and consequences of so much space activity is the emergence of certain challenges to the relative stability currently enjoyed in outer space. This includes threats such as collisions between spacecraft, the proliferation of space debris[188] and the risk of the spread of armed conflict into outer space. These phenomena are regarded as critical threats because of their potential to destabilize the space environment. Policymakers, having agreed that security in space should be strengthened in order to preserve the long-term utility of space, have begun to look for solutions to respond to these threats through strengthening multilateral agreements.

One option is the development of norms of behaviour for space activities, particularly norms of a voluntary, non-legally binding nature. Norms of behaviour are "rules of the road" that set parameters on what is considered by the international community to be responsible behaviour. This option has received considerable attention in multilateral fora because the voluntary nature provides much needed political flexibility for the building of consensus, which is not possible with a legally binding instrument, as has been seen in recent attempts to negotiate a treaty banning the placement or use of weapons in outer space.[189] A number of multilateral initiatives are presently underway that seek to establish just such a voluntary framework.

However, the manner in which such norms are implemented can have a wide range of economic, political, and technical impacts on the accessibility of outer space, not all of which will be felt uniformly by space actors. The adoption of any regulatory framework will also likely have unforeseen consequences that could create barriers to entry for new space entrants. Developing countries, in particular, will have limited technical and financial resources with which to meet new standards of conduct. This could prove to be a significant source of concern for emerging space actors. This paper examines the different approaches to norms of behaviour and their potential impacts on the space activities of different players, especially those in the developing countries. It also assesses the approaches being adopted by current multilateral initiatives to balance the need for new norms against the needs of developing countries and emerging space actors.

## EFFECTS OF NORMS OF BEHAVIOUR

Voluntary norms of behaviour can be embodied in a variety of instruments, including detailed bilateral agreements or broad international declarations. Regardless of the form, in the outer

188 Space debris is defined as all manmade objects including fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non-functional; Inter-Agency Space Debris Coordination Committee Space Debris Mitigation Guidelines, § 3.1.

189 S. Oznobishchev, "Codes of Conduct for Outer Space", in A. Arbatov and V. Dvorkin (eds.), *Outer Space: Weapons, Diplomacy, and Security*, Carnegie Endowment for International Peace, 2010, pp. 69–71. J. Moltz, *The Politics of Space Security*, Stanford Security Studies, 2nd ed. 2011, pp. 301–302.

space context, the purpose of norms is to influence actors to conform to a particular standard of conduct that will help to ensure the long-term sustainability of space activities for all.[190] To date, tools that have sought to establish norms of behaviour have typically done so through one of three approaches: technical guidance, information- and data-sharing, and cooperative mechanisms. A single instrument may apply any one of these approaches or a combination.

### Technical guidelines

Some of the norms that have been developed by the international community are technical guidelines based on best practices. These guidelines offer specific, detailed technical recommendations on how space activities can be conducted with a view towards ensuring the long-term sustainability of outer space activities. Best practices are typically based on lessons learned by established actors, and are largely bound by readily available technology. These instruments must be carefully balanced in order to promote safety without stifling activity all together.

One notable example is the Space Debris Mitigation Guidelines, developed by the Inter-Agency Space Debris Coordination Committee (IADC), which provides detailed recommendations for the operation of space assets so as to minimize the proliferation of space debris.[191] Another example is the Safety Framework for Nuclear Power Source Applications in Outer Space, developed by the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and the International Atomic Energy Agency, which sets out technical recommendations for the use of nuclear power sources in space assets so as to limit possible threats to humans and the environment.[192]

The primary benefit of technical guidelines is that they give specific recommendations that can have a quantifiable impact on problems. Under the Space Debris Mitigation Guidelines, for instance, spacecraft located in geosynchronous orbit (GEO)—one of the most highly populated orbits—should be manoeuvred at the end of mission as far above the orbit as possible so as not to interfere with other spacecraft and risk the creation of additional debris.[193] Such a provision can be readily acted upon.

These technical guidelines also have quantifiable costs that must be borne by space actors. In the example above, a satellite that must be moved to a higher orbit must carry sufficient fuel to accomplish such a manoeuvre. This will either increase the fuel payload, which increases launch cost, or will require a shortening of the spacecraft's operational lifetime so that there is enough fuel left to re-orbit. This can reduce the economic viability of a spacecraft.[194] Implementation will also require additional expertise in order to plan and execute the manoeuvre.

Such considerations are particularly challenging for emerging space actors that have limited technical and financial resources with which to operate. In this context, it is additionally beneficial that norms such as the Space Debris Mitigation Guidelines are of a voluntary nature, which provides flexibility in terms of application to allow emerging actors time to bring their activities into line with newly adopted standards.

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190 J. Beadsworth, "The role of political flexibility: building norms of behaviour for greater space security", presented at the UNIDIR regional seminar Building Confidence for Eurasian Space Activities Through Norms of Behaviour, Astana, 2–3 October 2013.

191 IADC Space Debris Mitigation Guidelines, § 1. The work of the IADC served as the basis for the Guidelines adopted by COPUOS and endorsed by the United Nations General Assembly. General Assembly, *International Cooperation in the Peaceful Uses of Outer Space*, UN document A/RES/62/217*, 1 February 2008.

192 L. Summerer and U.M. Bohlmann, "The STSC/IAEA Safety Framework for Space Nuclear Power Source Applications", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, p. 231.

193 IADC Guidelines, § 5.3.1. COPUOS Space Debris Mitigation Guidelines, guideline 7.

194 *State of the Satellite Industry Report*, sponsored by the Satellite Industry Association, prepared by the Tauri Group, June 2013. M. Holmes, "Ex-Im Bank chairman talks satellite investment strategy", *Via Satellite*, 3 September 2013.

### Information- and data-sharing

The second type of norm that has been applied to space activities is related to the transfer and sharing of information and data. This category includes notifications of launch activities, and the sharing of space situational data and of information related to space policies. Transparency and confidence-building measures (TCBMs), which call for states to "share information with the aim of creating mutual understanding and trust",[195] fall under this category.

Policymakers concerned with misperceptions regarding space activities find these norms useful because they can help to mitigate the risks of misunderstandings or miscalculations among states.[196] TCBMs can be useful in those cases where space activities are being carried out with dual-use technology that, while intended to be peaceful, might be perceived as threatening. TCBMs can also be useful in developing comprehensive space situational awareness for collision avoidance by providing critical additional data regarding the trajectory of spacecraft. Such measures are intended to augment existing space situational awareness, which is presently provided in large part by just a few select actors such as the United States of America and the Space Data Association.

Examples of norms related to information- and data-sharing can be found in the recent report of the United Nations Group of Governmental Experts on TCBMs in Outer Space Activities (GGE). One of the recommendations is that states provide notifications related to outer space activities such as space launches and orbital manoeuvres, particularly when such might pose a risk to the safety of other spacecraft.[197] It is hoped that this would give a clearer picture of daily space activities, fostering mutual understanding among space actors.

The bulk of activity under this approach to norms falls to established space actors, particularly those with dedicated military space programmes. The actors that carry out the most activities will have to submit the greatest amount of information and data. However, this approach can be a cause of concern for states wishing to protect sensitive information or data related to national security. Such a concern is likely to be the exception rather than the rule, and the political flexibility of norms could prove advantageous in balancing national security and space stability on a case by case basis.

Several instruments have also sought to establish parameters for consultations regarding space activities and the designation of points of contact. These provisions are intended to facilitate interactions between states, particularly for the transfer of information and data, and provide mechanisms for the peaceful resolution of disputes related to space activities. These can be found in a variety of instruments intended to establish norms of behaviour, including the GGE report.[198]

### Cooperative mechanisms

The third category of norms encourages cooperation among states for the provision of technical assistance for those states still developing space capabilities. In particular, such norms are intended to lower barriers through the sharing of technical knowledge and expertise at mutually agreed levels of cooperation. Such principles were drafted at the earliest stages of development of an international regime for space activities, in the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, adopted by the United Nations General Assembly in 1962 and reiterated in the Declaration on International

195 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN Document A/68/189*, 29 July 2013, para. 20.

196 F.A. Rose, "Pursuing space TCBMs for long-term sustainability and security", delivered at the International Symposium on Sustainable Space Development and Utilization for Humankind, Shinagawa, Tokyo, 28 February 2013.

197 General Assembly, *Report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities*, UN Document A/68/189*, 29 July 2013, paras. 39–45.

198 Ibid., paras. 57–59.

Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, adopted in 1996. While not creating an affirmative obligation to cooperate, these instruments have sought to ensure that developing countries are able to benefit equally from space activities through the strengthening of international relations.[199]

### A fourth approach?

As noted above, establishing voluntary norms of behaviour, particularly technical guidelines, will likely have consequences for emerging space actors. While norms such as TCBMs will require additional resources for compliance, their impact is unlikely to be considered a barrier to entry. Rather, it is the technical and financial hurdles that might be set in place that will pose challenges. There are other technical options to be explored that might not have such impacts on new entrants, but which have significant limitations. For example, proposals for the active removal of space debris from orbit face a host of legal, political, and financial complexities that will require years to be resolved before such operations could begin.[200] In this particular context, voluntary mitigation measures represent a useful first step.

Another possible option is for the international community to choose simply not to act. At the most recent session of the Scientific and Technical Subcommittee of COPUOS, the IADC presented a report on the stability of the low-Earth orbit (LEO) environment, in which it concluded that the present level of debris created by outer space activities is not sustainable.[201] Furthermore, it added that even assuming 90% compliance by space actors with the Space Debris Mitigation Guidelines, more aggressive mitigation measures will nevertheless be necessary to ensure that current space activities can continue in these limited orbits. The cost of such measures to space-based services would include the necessity to utilize new, less useful orbits for operations and the hardening of satellites against space debris. The alternative of inaction becomes less tenable even for emerging space actors when one considers the implications of operating in a space environment where debris has been allowed to proliferate even further.

With the support of emerging actors—who stand to be major players in space in the near future—norms of behaviour have a significantly better chance of making noticeable impact on the security and stability of outer space. Policymakers have at their disposal the two previously mentioned approaches to norms of behaviour, capable of offsetting the burden incurred by emerging space actors in ensuring the stability of space. The question then becomes one of achieving the right balance of obligations for established and for emerging space actors in order to command widespread support.

## ACHIEVING THE RIGHT BALANCE

Policymakers are seeking the right balance of voluntary norms of behaviour in order to spread the burden of ensuring space stability among all actors in such a way as to minimize additional barriers to entry for new actors. One recent initiative is the previously mentioned report of the GGE on TCBMs. The report invites space actors to share as much information as possible with others so as to provide a clearer picture of what is happening in outer space.

199 G. Hafner, "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States", in I. Marboe (ed.), *Soft Law in Outer Space: The Function of Non-Binding Norms in International Space Law*, 2012, pp. 272–274.

200 B. Weeden et al., "International Perspectives on On-Orbit Satellite Servicing and Active Debris Removal and Recommendations for a Sustainable Path Forward", IAC-13.E3.4.7, 64th International Astronautical Congress, Beijing, China, September.

201 The report is available at www.unoosa.org/pdf/pres/stsc2013/tech-12E.pdf.

Another initiative is the Working Group of the Scientific and Technical Subcommittee of COPUOS on the Long-Term Sustainability of Outer Space Activities, which has presented drafts of the proposed guidelines to COPUOS for comment.[202] The Working Group makes technical recommendations on space activities with the objective of ensuring that the benefits of space activities are maintained for sustainable development on Earth. While providing technical guidelines that will have an economic impact—including that the COPUOS version of the Space Debris Mitigation Guidelines be incorporated into national legislation—their work specifically considers the needs of developing countries. It includes recommendations for cooperation and data exchange on issues such as disaster mitigation, space situational awareness, and space weather. The Working Group seeks to lessen the burden for emerging space actors of adhering to norms of behaviour in space activities through cooperative efforts with established space actors.

Another notable multilateral initiative under discussion is the European Union's proposed International Code of Conduct for Outer Space Activities (ICoC). This initiative seeks to mitigate threats posed by the proliferation of space debris and the potential spread of armed conflict into outer space through establishing voluntary norms of behaviour. To achieve this, the ICoC uses a combination of all three approaches listed above. While offering some technical guidelines on issues such as space debris, it also contains recommendations for increased cooperation among states and the designation of points of contact.[203] It also provides numerous TCBMs intended to enhance space situational awareness, a provision that would benefit all actors provided that such data is made publicly available in a timely manner.[204]

## CONCLUSION

As the world grows increasingly dependent on outer space activities, it is clear that measures must be taken to ensure that the stability that facilitates so many space-based benefits is not lost. In this context, policymakers seek to establish standards of conduct that will enhance the safety and security of the space domain. But such standards will also create barriers to entry. This is particularly true for technical guidelines, more so than for TCBMs or cooperative mechanisms. These barriers will be felt most acutely by new space actors with limited technical and financial resources for space activities. However, at present, political and technical realities are such that other alternatives are not viable, and the price of inaction is too costly for all actors. In this context, policymakers have proposed numerous options for offsetting the potential technical and financial hurdles for new space entrants, through mutually agreed levels of international cooperation, as well as information- and data-sharing. The challenge for these multilateral initiatives to develop norms is to strike the right balance among the various approaches to norms so that the interests of all actors are taken into account.

202 General Assembly, *Compilation of Proposed Draft Guidelines of Expert Groups A to D of the Working Group on the Long-term Sustainability of Outer Space Activities, as at the Fiftieth Session of the Scientific and Technical Subcommittee, Held in February 2013*, UN Document A/A.C.105/1041, para. 2.

203 Sections II and III of the draft ICoC, ver. 16, September 2013.

204 Section III of the draft ICoC, ver. 16, September 2013.