

Space Security Seminar at the London Institute of Space Policy and Law (ISPL)

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The seminar focused on risks to the security of space systems and associated activities, both in terms of physical dangers in near-Earth space and threats in cyber space. Although numerous current difficulties were identified, potential solutions were explored by the four speakers and in a discussion session.

Space law, its history and perceived shortcomings were highlighted by Maria Pozza,² with specific focus on the role it can play in controlling an arms race in space, particularly the international treaties that are the foundation of space law and govern the behaviour of states in space. Arms control provisions within these treaties focus on preventing the use of weapons of mass destruction and do not address the problem of kinetic weapons in orbit. Not all parties perceive a risk of an arms race in outer space, and there is some ambiguity in the legal position regarding arms in space. Views also differ on whether space has been weaponised. Moreover the political environment currently favours non-binding instruments rather than new treaties, as witnessed by the diminishing support for the *Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects* (PPWT 2008) and increased support for the EU's initiative to develop an international Code of Conduct.³ She also mentioned the issue of debris removal systems, which might also be used as weapons.

The five treaties underlying space law were written before two significant contemporary threats were identified – orbital debris and cyber security. Mark Roberts⁴ addressed the risks posed to space systems by cyber attack, with the chilling observation that for every imaginable unpleasant scenario, there is probably someone already working on making it a reality. Highlighting the importance of space resources and the threat to them, he conceptualised a 'Day Without Space' to demonstrate how reliant modern society has become upon space. This threat is asymmetric: systems that cost millions to produce can be disrupted by a single hacker with a laptop. A number of risks were identified, along with their consequences and examples from the past twenty years. Hijacking a satellite

¹ Dr Andrew Brearley is an Independent Researcher, and was joint Rapporteur with Valentino Quaggiato, who is undertaking an MPhil at ISPL. Professor Sa'id Mosteshar is Director of ISPL. The seminar program may be found at http://www.space-institute.org/app/uploads/1377070293_Prog_&_Description_ver1-7_venue_Senate_House.pdf.

² Maria Pozza is Lauterpacht Visiting Fellow, Lauterpacht Centre for International Law, University of Cambridge.

³ Throughout the presentations and discussion reference was made to "soft law", a term used to refer to instruments and regimes that are not *law* but guidelines and practices voluntarily observed by some. This report avoids the use of the term.

⁴ Mark Roberts CBE, MBA, FCMI is Programme Manager at Atkins Global.

and moving it into the path of another satellite is theoretically relatively simple: in 2011 Terra EOS & Landsat 7 were attacked and the hackers were assessed to have ‘achieved all steps required’ to assume control of the satellites’ operations. Further complicating the situation is that there is no international consensus on cyber security in space, nor a uniform legal framework to prevent, contain or punish cyber attacks. Furthermore, capabilities necessary to deal with cyber security may not yet be available.

Richard Crowther⁵ addressed the challenge of space security in terms of governance, particularly in the context of the institutions that have been created to regulate the space environment. The three main international bodies responsible for governance in space are the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), the International Telecommunications Union (ITU), and to a lesser extent the Conference on Disarmament (CD). He discussed the long-term sustainability of outer space activities, including in particular the risk to it posed by space debris. The problem of debris is a pressing issue with political, legal and technological aspects. The response to it – including measures such as the Space Debris Mitigation Guidelines 2007 – has been instrumental in limiting debris growth, but has not entirely resolved the problem. Further, progress made in mitigating the proliferation of debris can be compromised by the consequences of a single ASAT collision in orbit.

Technologies to counter the effects of debris and to remove it from orbit are being explored, but none are yet ready to be deployed. The example of the malfunctioning Envisat satellite was discussed in relation to de-orbiting and its legal and technical implications. These technological solutions are complicated by the political problem of potential dual military and civilian use. In particular, it was pointed out that a system that can be used to remove a dangerous piece of debris from orbit could also be utilised as a weapon in space, to target an operational satellite. The presentation concluded in emphasising the important role of, and need for, space situational awareness in addressing debris but also creating an environment of trust amongst space-faring nations.

The need for a space security policy encompassing civilian, commercial and military areas was discussed by Martin Johnson.⁶ He stressed the long-term benefits generated by modern space applications. Primarily addressing the UK context, he also included international considerations in space security. With political and legal challenges to the process, there are areas in which a better understanding of the issues is needed, and commitment from all stakeholders. Two principle questions arise in the formulation of the policy. First, who is it for - government, industry, other actors or a combination? Second, is it the objects in space that are to be secured, or the capacity on the ground? Objectives of a functioning policy could include: resilience; risk mitigation; industrial growth; and national security. The complexities of a space security policy are such that it may be necessary for it to be addressed within international fora, as numerous risks are shared. This is particularly so when resources to be secured have more than one owner.

Both Richard Crowther and Martin Johnson stressed the need for transparency and confidence-building measures to foster trust and greater openness among states that need to cooperate in creating a sustainable space environment.

⁵ Professor Richard Crowther is Chief Engineer, UK Space Agency.

⁶ Group Captain Martin Johnson is Deputy Head for Space Policy at the Ministry of Defence.

Following the presentations, there was discussion about a number of topics including the cost of removing debris already in orbit and whether there was a current solution. For a debris removal system to be viable it would have to be able to cleanse near-Earth space of more than one object per mission. Mitigation alone is not a solution to the problems in orbit: debris will have to be removed and although this will not be easy, it will be necessary.

Another area of discussion concerned the possibility of managing risk by changing the balance of resources in favour of ground-based options. It was observed that the space environment could not be free of risk, and that there is a role for both ground- and space-based resources. There would be no one single answer to such a complex issue. The financial resources available would also play a role in determining the practical options.

The principle theme that emerged from the seminar was that human activity is increasingly conducted in space, and the political problems associated with it will also increase. Given the nature of space, the issues that emerge require solutions that would not be applicable or necessary on the surface of the planet, for instance within a single State. Presently the international focus is on guidelines and other non-binding measures rather than on new treaties. However, both approaches require concerted international action in order to address issues for mutual benefit, as many of the problems discussed at the seminar affect all who use space. Addressing these problems is a process that requires confidence-building measures. National and international policies will need to be drawn up to address security concerns. The forthcoming UK National Space Policy was of great interest to the participants at the Seminar.

The Seminar identified some areas of work that remain to be done. These include:

- Measures to prevent the placement of arms in space;
- Steps to identify the nature and manner of cooperation needed to combat cyber attacks;
- Creation of a legal, political and economic framework to facilitate active debris removal; and
- Creation of national space policies promoting the sustainability of outer space.

The overall view of the present situation based on the dialogue at the seminar is one of cautious optimism. The trained eye can see enormous technical, policy and legal difficulties in the future. However, some optimism may be drawn from having identified the nature of the problems we face. The difficulties are not insurmountable, and it is unclear whether the resources and political will are currently available to enact working solutions. Benjamin Franklin's observation is therefore apt in the context of space security: an ounce of prevention is worth a pound of cure.