I. Introduction

1. Forty years of discussions related to the prevention of an arms race in outer space (PAROS) at the United Nations (UN) have been marked by disputes on the objective and means of implementing this essential mandate. Progress requires finding ways forward that nurture complementarity across various approaches.

2. This working paper is based on extensive research by Project Ploughshares and on expert consultations conducted by Project Ploughshares on lessons learned from other domains of arms control and how these can be applied to outer space, and on the development of norms of responsible behaviour for space. Our findings suggest that arms control is not a discrete tool of security; rather it forms part of a broad regime of security governance that includes principles and norms; restrictions and obligations; compliance and confidence-building measures; and tools, institutions, and mechanisms that facilitate ongoing political engagement, dialogue, and the implementation of measures that enhance collective security.

3. Transparency and confidence-building measures (TCBMs) are a core feature of such a regime and should be incorporated into any legally binding agreement on PAROS. Core objectives of the GGE on PAROS should be to identify how existing tools and resources can be incorporated into additional agreements on PAROS, and to articulate the specific gaps that need to be filled. In doing so, the GGE can help to inform the work of the two upcoming parallel Open-Ended Working Groups on norms of responsible behaviour and legally binding approaches to PAROS so that the work of each complements the other. It is time to move beyond talking about transparency to creating mechanisms to implement longstanding commitments.

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1 The present document is being issued without formal editing.
II. Why transparency is essential

4. The operating environment in outer space – with secrecy prevalent and the absence of transparency, trust, and dialogue – is a significant source of the collective insecurity that is conducive to arms racing. The opacity of the operating environment is augmented by the nature of space technology, which features dual-purpose capabilities and dual uses of space systems, both of which can obscure the nature of capabilities, intentions, and possible harms. Any attempts to prohibit weapons or harmful uses of space systems must first define, identify, and verify such systems, effectively differentiating them from peaceful counterparts; a lack of clarity about both capabilities and activities in outer space impedes such efforts.

5. During the course of our research on outer space security, experts have pointed to transparency as the most relevant practice. Transparency practices are necessary to avoid the miscommunication and misinterpretation that can lead to unintended conflict or conflict escalation. They are also central to formal arms restrictions and can aid with the identification and differentiation of potential weapons systems, provide confidence in implementation of and compliance with restrictions, and facilitate ongoing dialogue and interaction in support of agreements.

III. A focus on communication and observability

6. Transparency is a complex and often contested concept that can cover a range of interpretations, from meeting only basic reporting requirements to ensuring a complete lack of secrecy; the best approaches lie between these extremes.

7. The goal of transparency is to promote confidence. But confidence in what? Previous studies on TCBMs related to outer space have focused on “concrete actions that express a political commitment whose significance can be examined, verified and assessed.” At their core, such actions combine communication with observability to provide reassurance about the nature of capabilities and how they are being used. Such communication can take many forms and be related to both activities and capabilities. The following means of communicating about capabilities, activities, and intent ARE most useful for legally binding arms control that meets the objective of PAROS:

- Information exchange and sharing
- The provision of notifications and disclosures
- Establishing norms of behaviour and operational practices
- Adopting design approaches to differentiate the physical capabilities and applications of space systems
- Establishing direct lines of contact and consultation.

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4 West and Doucet, From Safety to Security.
5 Results of a poll of experts generated on November 3, 2020 and first published in West and Doucet, From Safety to Security, pg. 16.
8 Peter Martinez, Richard Crowther, Sergio Marchisio, Gérard Brachet, “Criteria for Developing and Testing Transparency and Confidence-Building Measures (TCBMs) for Outer Space Activities,” Space Policy, Volume 30, Issue 2, (2014), pg. 91-97, online: https://doi.org/10.1016/j.spacepol.2014.03.006.
IV. Incorporating transparency measures into a legally Binding agreement on PAROS

8. Efforts to identify and encourage adoption of TCBMs are among the few under the PAROS mandate that have made progress. Three landmark initiatives stand out:
   
   • The 1993 UN Secretary-General Report on a study on the application of confidence-building measures in outer space, detailing many avenues for pursuing and implementing TCBMs, including as part of legal agreements.
   
   • The 2013 report of the Group of Governmental Experts on Transparency and Confidence-building Measures in Outer Space Activities, which recommends a series of actions including exchange of information relating to national space policy, notifications on outer space activities aimed at risk reduction, and visits to space launch sites and facilities.
   
   • The 2023 UN Disarmament Commission Recommendations to promote the practical implementation of TCBMS within the context of PAROS, indicating dialogue, points of contact, notifications, and sharing orbital information as key steps.

9. TCBMs have typically been viewed as “intermediate” efforts in advance of legally binding agreements\[^9\] or as necessary but insufficient measures to control arms. But our research indicates that they really are a core part of what is required to implement arms control agreements, in particular to define and differentiate weapons applications of technology, enabling confidence in compliance with arms restrictions, and providing key means and mechanisms of ongoing implementation.

A. Differentiating and identifying weapons applications of space technology

10. Challenges associated with defining a space weapon have slowed progress on PAROS. The fallback position that “anything can be a weapon” is often cited to eschew formal arms control in outer space. Yet precedents from airplanes to nuclear power show that multiple applications of a specific technology are reasons for, rather than obstacles to, arms control.

11. The key requirement of a definition of a space weapon is that it clarifies the distinction between weapons/non-peaceful applications of technical abilities and peaceful applications. Transparency about both the hardware of space capabilities and the conduct of space activities can help to create the criteria for each. Our research suggests that the following measures can help to communicate and make observable different applications of dual-purpose technology:

   (a) Establish the means of differentiating technical capabilities by:
   
   • Keeping various technology applications and facilities separate;
   • Distinguishing locations/sites of hardware/military applications;
   • Pursuing observable design differences for specific applications of dual-purpose capabilities.

   (b) Establish practices associated with permitted/peaceful activities such as:
   
   • Creating declarations of permitted activities;
   • Issuing notifications before activities are conducted;
   • Issuing disclosures of activities and capabilities;
   • Holding consultations with other space nations to clarify intended activities.

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B. Confidence in compliance

12. How to verify compliance with arms control agreements? The inability to answer this question has also impeded progress on legal approaches to PAROS. While originally viewed as a technical ability to detect violations, over time verification has broadened to focus on a collection of processes, tools, and institutions that support and create confidence in the full and consistent enactment of the agreement.\(^\text{10}\) In other words, verification ensures that all parties to the agreement adhere to all terms by giving parties confidence that implementation processes are in place and that adequate processes are activated when implementation is suspected of being incomplete.

13. The ability to have confidence in compliance requires layers of cooperative measures that support both technical verification and active demonstrations of compliance.\(^\text{11}\) Our research indicates that this effort must flow from a foundation of transparency, observability, and cooperation.

Figure 1: Approaches to compliance identified in content coding of arms control agreements\(^\text{12}\)

<table>
<thead>
<tr>
<th>Approach</th>
<th>Measures</th>
</tr>
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<tbody>
<tr>
<td>Transparency and Confidence-building measures</td>
<td>Communications measures; (Diplomatic channels, hotlines); Notifications; Reporting; Information sharing/ exchange; Joint research; Joint operations; Declarations; Disclosure (capabilities, activities, location etc.)</td>
</tr>
<tr>
<td>Cooperative measures for verification</td>
<td>Non-concealment (of hardware or purposes); Allow inspections; Non-interference; Observable design differences; Notifications</td>
</tr>
<tr>
<td>External verification measures</td>
<td>Scheduled inspections; General observation; International monitoring systems; Surveillance; National technical means; Detection; Monitoring</td>
</tr>
<tr>
<td>Addressing compliance concerns</td>
<td>Consultations; Clarifications; Challenge inspections; Absolve ambiguities/ different interpretations; Complaint procedures; Meeting of states parties</td>
</tr>
<tr>
<td>Resolving disputes</td>
<td>Dispute settlement mechanism; Consultations; ICJ</td>
</tr>
<tr>
<td>Addressing violation</td>
<td>Investigations; Fact finding missions</td>
</tr>
<tr>
<td>Enforcement</td>
<td>UN Security Council; Sanctions; Liability</td>
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14. Observability is key, with priority given to measures that can be independently observed and monitored and to measures that increase the observability of space activities. The Hague Code of Conduct against Ballistic Missile Proliferation, for example, adopts a declare-and-verify attitude to transparency and confidence-building. The Vienna Document developed by the Organization for Security and Co-operation in Europe (OSCE) provides examples of security arrangements designed to facilitate transparency specific to military arms restrictions. Parties commit to:

- Information exchange
- Notifications
- Acceptance of inspections
- Mutual observation
- Consultation.

15. Transparency measures such as notifications, more ambitious registration practices, information exchanges, and national reporting can also help to make space activities more observable. Many such measures were identified in the 2013 consensus report by the GGE on TCBMs for outer space. Efforts to both share and provide greater accessibility to orbital data can also help.

16. Establishing norms of behaviour and creating mechanisms for direct communication also nurture confidence in compliance. Norms of behaviour help to make activities associated with space missions more predictable and observable, bridging the interpretation gap associated with the technical means of verification. Providing adequate means of communication through consultation and clarification allow effective managing of compliance concerns and disputes.

C. Means and mechanisms of implementation

17. While arms control agreements are political, they have technical objectives and obligations that must be supported by an array of tools, mechanisms, and institutions that will be used cooperatively to share and access information relevant to the agreement.

18. Little institutional infrastructure currently exists to facilitate cooperative governance and arms control in outer space. Needed are mechanisms that support the development, implementation, and monitoring of arms control agreements, including core tools and processes that support transparency through dialogue, exchanging information, consultations, and communication at political and operational levels. There is also a need to make better use of existing mechanisms, such as the Registration Convention.

V. Including nonstate actors

19. Although legal arms control measures are the prerogative of states, private-sector and civil-society actors provide key resources to support implementation and compliance with arms control, specifically through efforts that contribute to transparency.

20. A growing array of private-sector space situational awareness (SSA) services are available. These service providers can strengthen implementation of, and compliance with, agreed rules and restrictions in outer space by bringing greater transparency to the space environment – if they are provided with appropriate resources and support.

21. Civil society is also necessary for the successful implementation of arms control agreements. Civil society provides resources and public information that are critical for monitoring compliance. One example is the Landmine and Cluster Munitions Monitor, the research and monitoring arm of the International Campaign to Ban Landmines and the Cluster Munition Coalition. It provides information on, and assessments of, international activities on these munitions. Another example is the Arms Trade Treaty Monitor, which

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tracks implementation of, and compliance with, the ATT, using open-source intelligence, among other sources. UNIDIR’s Space Security Portal is a space-specific example of a nonstate confidence-building tool to promote greater transparency.

VI. Conclusion

22. TCBMs are necessary and feasible components of legal approaches to PAROS. Such efforts should prioritize greater use of notifications, registration and disclosure, data sharing, consultations, and maintaining direct lines of communication. A variety of ways of communicating the nature of space capabilities and activities should be developed to make differences and distinctions more observable to others.