

# Enhancing Security by Promoting Responsible Behavior in Space

TO MAINTAIN AND enhance the strategic advantages the United States derives from space, we must address the challenges of a domain that is increasingly congested, contested, and competitive. Global security and prosperity are increasingly dependent on space capabilities. Information transmitted through space enables our military to project global power and underpins an increasingly globalized economy. Protecting our ability to operate effectively in space is a key component of the new defense strategic guidance signed by Defense secretary Leon Panetta in January 2012.

The *National Security Space Strategy (NSSS)*, cosigned by the secretary of defense and the director of national intelligence, establishes multiple ways to protect our advantage in an evolving strategic environment. These include increasing the effectiveness and resiliency of our space-based capabilities and leveraging growing commercial and foreign capabilities. Foundational to the overall approach is promoting the responsible use of space through cooperative approaches that strengthen the sustainability, stability, safety, and security of the domain. Safeguarding space strengthens the security of the United States and its allies.

Collaboratively defining what it means to act responsibly in space can create a community of national and commercial space operators with a common understanding of and interest in acceptable behavior in this part of the global commons. As more operators act responsibly, interference with space systems may decline, enabling those military and intelligence missions and civil and commercial applications that rely on space capabilities. Additionally, a common space “rule set” can enable military space operators and intelligence analysts to more easily identify irresponsible actions by aggressive or rogue actors, enabling accurate attribution and possibly building consensus for coalition or international action to uphold freedom of access to the space global commons. Over time, this should discourage destabilizing, irresponsible acts such as China’s 2007 test of an antisatellite weapon.

Each segment of the space community can contribute to defining responsible behavior—from top-down diplomatic approaches pursued by nations and multilateral institutions to bottom-up best practices developed and demonstrated by commercial operators, academic institutions, and other

technical experts. With more than 50 years of space experience, the DoD has an important role to play in many of these initiatives—and a stake in their success.

## **The Challenges of an Evolving Domain**

Space capabilities enable our economy and our military, allowing our troops to see with clarity, communicate with certainty, navigate with accuracy, and operate with assurance. Satellites collect weather data and images of the earth for a variety of civil, commercial, and national security applications. The ubiquitous timing signal of the US Air Force global positioning system enables financial markets, search and rescue, agriculture, global supply chains, and precise navigation anywhere on Earth. US and allied forces rely upon satellites to operate far from established terrestrial networks. Satellite communications provide the backbone for long-haul intelligence, surveillance, and reconnaissance data streams such as those provided by remotely piloted vehicles, which themselves are operated via satellite. All of these capabilities are critical to a joint force projecting power to protect US and allied interests.

But space systems face an increasing range of potential threats—both purposeful and unintentional. Space is increasingly congested, contested, and competitive. Today approximately 60 nations and government consortia own or operate satellites, and commercial space services are expanding. The DoD tracks approximately 1,100 active satellites and 21,000 pieces of debris, and the National Aeronautics and Space Administration (NASA) estimates there are likely several hundreds of thousands of additional pieces of debris too small to track with current sensors yet still capable of damaging satellites in orbit. For an adversary seeking to disrupt or deny the ability of the United States to project power, space capabilities may provide an appealing target set, especially early in a crisis or conflict. Counterspace systems, in particular low-end jammers, are proliferating and becoming an integral part of antiaccess/area denial efforts of potential adversaries.

## **Defining Responsible Behavior to Enhance National Security**

The growing use of space presents shared challenges for current, emerging, and future space-faring nations. As stated in the 2010 US *National*

*Space Policy*, “All nations have the right to use and explore space, but with this right also comes responsibility.” The policy further “calls on all nations to work together to adopt approaches for responsible activity in space to preserve this right for the benefit of future generations.”

Establishing widely accepted guidelines for responsible behavior in space can enhance the national security of the United States and its allies while enabling the peaceful space activities of all who seek to benefit from space. Together with enhancing the resilience of US and partner space capabilities, collaborating with other responsible space operators, and maintaining the capability to respond to potential attacks, promoting responsible behavior in space is the foundation of a multilayered approach to deterring threats to US space systems.

Strengthening the responsible use of space will enhance our ability to derive benefit from national security space activities, in particular as the space domain becomes more sustainable, stable, safe, and secure. We will maintain our strategic advantage if our national security “eyes and ears” can perform their mission without the threat of purposeful or unintentional interference. This underpins the success of our military forces, intelligence collection, and the many civil and commercial space services foundational to our economic security.

Additionally, we may be able to simplify identification and attribution of hostile or other bad behavior by developing international consensus around what defines responsible, peaceful, and safe behavior. If nations commit to a standard of conduct, actions outside of the norm will be easier to recognize. We can therefore be more efficient in our use of space situational awareness (SSA) resources to identify those behaviors recognized as indicators of hostile intent. If an irresponsible act takes place, a community of operators committed to responsible behavior can more quickly come together to isolate rogue actors, and we can build on these partnerships to create coalitions of responsible space-faring nations.

## **The Department’s Role in Promoting Responsible Behavior**

The DoD has an important role to play in US government and international discussions of responsible behavior. First and foremost, the department has significant operational experience that can be brought to bear in developing “rules of the road” for space. The DoD fields satellites in almost

every space mission area and has the most extensive SSA network in the world. Second, it has, over the past two years, expanded its relationships with commercial and international space operators through the US Strategic Command (USSTRATCOM) SSA-sharing program. Through SSA sharing, the DoD is establishing a reputation as a valuable resource for ensuring spaceflight safety for all space operators.

Finally, the department has much to lose from irresponsible acts that threaten the sustainability, stability, safety, and security of the domain. The DoD must take action to ensure it can continue to derive national security benefit from the space domain. We will draw on our operational expertise and expanding relationships to work with the Department of State, NASA, and other US government, commercial, and foreign space operators to define responsible behavior.

## **Ways to Define Responsible Behavior**

The United States will continue to lead in defining the responsible, peaceful, and safe use of space with the many nations, commercial firms, and intergovernmental organizations that field, or aspire to field, space capabilities. But because space is no longer populated by government satellites alone, a variety of means must be pursued to cooperatively define responsible space operations. Everything from diplomatic initiatives, such as an international code of conduct for space, to technical standards and best practice guidelines can contribute to this goal. As stated in the *National Security Space Strategy*, “The United States will support development of data standards, best practices, transparency and confidence-building measures, and norms of behavior for responsible space operations.” These different approaches to defining responsible behavior can and should be pursued by different segments of the growing community of space operators and space users.

## **Transparency and Confidence-Building Measures**

Consistent with *National Space Policy* guidance, one top-down diplomatic initiative the United States is pursuing is bilateral and multilateral transparency and confidence-building measures (TCBM) to encourage responsible actions in, and the peaceful use of, space. TCBMs generally consist of information sharing and mutual assurances to reduce the chances

of mishaps, misperception, and mistrust. The United States is currently engaged in a number of bilateral TCBMs with Russia, including visit exchanges to military space installations and sharing of information on space policies and strategies. These measures are important for increasing understanding, fostering trust, and enhancing stability. Additionally, the United States participates in bilateral space security dialogues with other major space-faring nations to exchange information and develop deeper understanding of each others' policies and programs. The department also leads its own space cooperation forums to support direct military-to-military exchanges with key allies and partners.

TCBMs, however, need not be limited to bilateral relationships. The United States has subscribed to the voluntary Hague Code of Conduct (HCOG) against Ballistic Missile Proliferation, which requires subscribing states to announce to other subscribing states planned ballistic missile and space vehicle launches. The HCOG consists of a set of general principles, modest commitments, and limited confidence-building measures and is intended to complement, not supplant, the Missile Technology Control Regime.

An upcoming UN Group of Governmental Experts will examine space TCBMs in a multilateral forum with the goal of developing a catalog of measures that define aspects of responsible behavior related to space. The United States intends to play an active role in this group and believes proposals could include measures aimed at enhancing the transparency of national security space policies, strategies, activities, and experiments; notifications regarding environmental or unintentional hazards to space-flight safety; and the use of international consultations regarding outer space operations to prevent incidents and minimize the risks of potentially harmful interference. While there will always be limits to the national security information shared by the United States and other nations, broadly increasing dialogue between space-faring nations can help build understanding and strengthen relationships that could prove invaluable during a potential crisis.

## **Codes of Conduct**

Space-faring nations can work cooperatively to capture key TCBMs and other elements of responsible behavior in a diplomatic code of conduct. An international code of conduct for outer space activities, such as the one proposed by the European Union (EU), could serve as a voluntary

framework that describes how responsible states operate in space. The core elements of a code should include those measures that are in the interests of all space-faring nations.

A code of conduct can enhance US national security by serving as one of the most visible and political ways in which nations commit to acting responsibly in space. Nations willfully acting contrary to a code could expect to be isolated as rogue actors. A code of conduct such as the EU's draft proposal would enhance US national security by building international political consensus around precepts such as debris mitigation, collision avoidance, hazard notifications, and general practices of spaceflight safety. The precepts in the EU's proposal are largely consistent with current US practices and, because the draft focuses on behaviors, not capabilities, it would not constrain development of, for example, missile defense. Also to the benefit of US national security, the EU draft applies only in peacetime and explicitly recognizes that the inherent right of individual and collective self-defense extends to the space domain.

The development and negotiation of a code could play an important role in building international political consensus and understanding around key concepts of responsible behavior. To ensure the broadest adoption and implementation of such a code—and the benefits that would entail—it should be developed collaboratively by all responsible space-faring nations.

### **Best Practice Guidelines**

Moving away from top-down initiatives undertaken by nations are bottom-up best practice guidelines for all phases of a space system life cycle—design, launch, operation, and end of life. Best practice guidelines develop over time and grow out of successful experience and operator requirements. In some ways, developing best practice guidelines is the most inclusive process because all operators, irrespective of whether they are governmental, commercial, academic, or otherwise, have a shared interest in spaceflight safety.

International space debris mitigation guidelines are one successful example of the collaborative development of space best practice guidelines. Based on the US government Orbital Debris Mitigation Standard Practices, the Inter-Agency Debris Coordination Committee (IADC)—an international committee of national space agencies—developed a set of technical guidelines for minimizing the creation of space debris. The Scientific and Technical

Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (COPUOS) used the IADC guidelines to develop a similar set of UN debris mitigation guidelines, which were subsequently adopted by the full committee and endorsed by the General Assembly.

The upcoming COPUOS working group on the long-term sustainability of space activities presents a similar opportunity for developing best practice guidelines in other areas of space activity. Beginning in 2012, technical experts from all COPUOS member states will be invited to participate in a working group examining, among other things, best practice guidelines for debris mitigation, debris removal, collision avoidance, rendezvous and docking, launch notification, collaborative sharing of space situational awareness, and space weather. This working group will collaboratively develop a compendium of guidelines that, in essence, define how those involved in space activities—from engineers to operators—can contribute to the long-term sustainability of space activities.

The United States intends to play an active role in the UN work on sustainability. Building upon the experience of NASA, NOAA, and DoD space operators, as well as US commercial space service providers, the United States will share its best practices in many of these areas. The department's experience in space system design, launch, operations, and end of life will serve as a solid foundation for US government inputs to this forum. The experience of USSTRATCOM in providing SSA support to other operators will prove especially valuable. Through the USSTRATCOM SSA-sharing program, commercial or international space operators can, with a negotiated agreement, receive assistance in screening maneuver plans, screening launch and disposal windows, and locating and resolving sources of interference. Operators also receive notifications of potential close approaches within predefined safety volumes.

These collaborative opportunities to work through shared operational challenges will result in common understanding of the best practices that define responsible space activities. As new technologies enable new operating concepts—such as on-orbit servicing and distributed and fractionated architectures—new best practices will, over time, naturally emerge to govern these activities in ways that benefit all future users of space. All space operators engaged in new types of space activity—government, commercial, academic, or otherwise—will play a role in establishing guidelines as they gain design, development, launch, and operational experience.

## Technical Standards

Finally, truly bottom-up technical standards also have a role in defining responsible behavior. Organizations such as the International Organization for Standardization (responsible for the ISO-9000 series of standards on quality management, for example) use a rigorous and disciplined technical process to develop standards ranging from screw thread tolerances to information system formats. They have developed several standards on space safety and orbital debris mitigation. Though the process of developing standards can be long, it is one that involves a variety of stakeholders—including government, industry, and academia.

The Consultative Committee on Space Data Systems is developing standards for space data and information systems to facilitate collaboration among space agencies. USSTRATCOM is working with this committee and other standards organizations to develop space standards for space situational awareness information. These types of standards will reflect the best practices of industry and government and enable greater collaboration and information sharing in the future.

## An Integrated Approach

Each of these ways to define responsible behavior should be pursued by the many nations, commercial operators, and intergovernmental and nongovernmental organizations operating or benefiting from space capabilities. Each approach has its strengths and weaknesses, and each can be best developed by a particular segment of the space community.

No matter which venue is most successful or pursued most vigorously, all can enhance the national security of the United States and its allies while protecting the strategic advantages we derive from space. Increasing responsible behavior in space can make the space domain a safer and more secure operating environment, discourage irresponsible acts but identify them if they occur, and build consensus for maintaining order in an increasingly congested, contested, and competitive domain. Reducing threats to US and allied space systems will enhance our ability to project power over global distances to deter aggression and assure our allies and regional partners.

As stated at the outset, promoting responsible use of space is just one element of our *National Security Space Strategy*. To effectively contribute to our security, it must be complemented by effective space capabilities



responsive to new threats and war-fighter needs; demonstrated resiliency in key mission areas enabled by space, including through backup capabilities in other domains; and a readiness to respond in self-defense, including in other domains. A common space rule set can advance our interests but is no substitute for robust and resilient military capabilities.

Secretary Panetta's new strategic guidance calls for the United States to continue leading global efforts to assure access to and use of the global commons, both by strengthening international norms of behavior and by maintaining necessary military capabilities. The Department of Defense has an important role to play in both areas.

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